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Goldwin Smith.

With the respects  
of the Author

To Prof Goldwin Smith

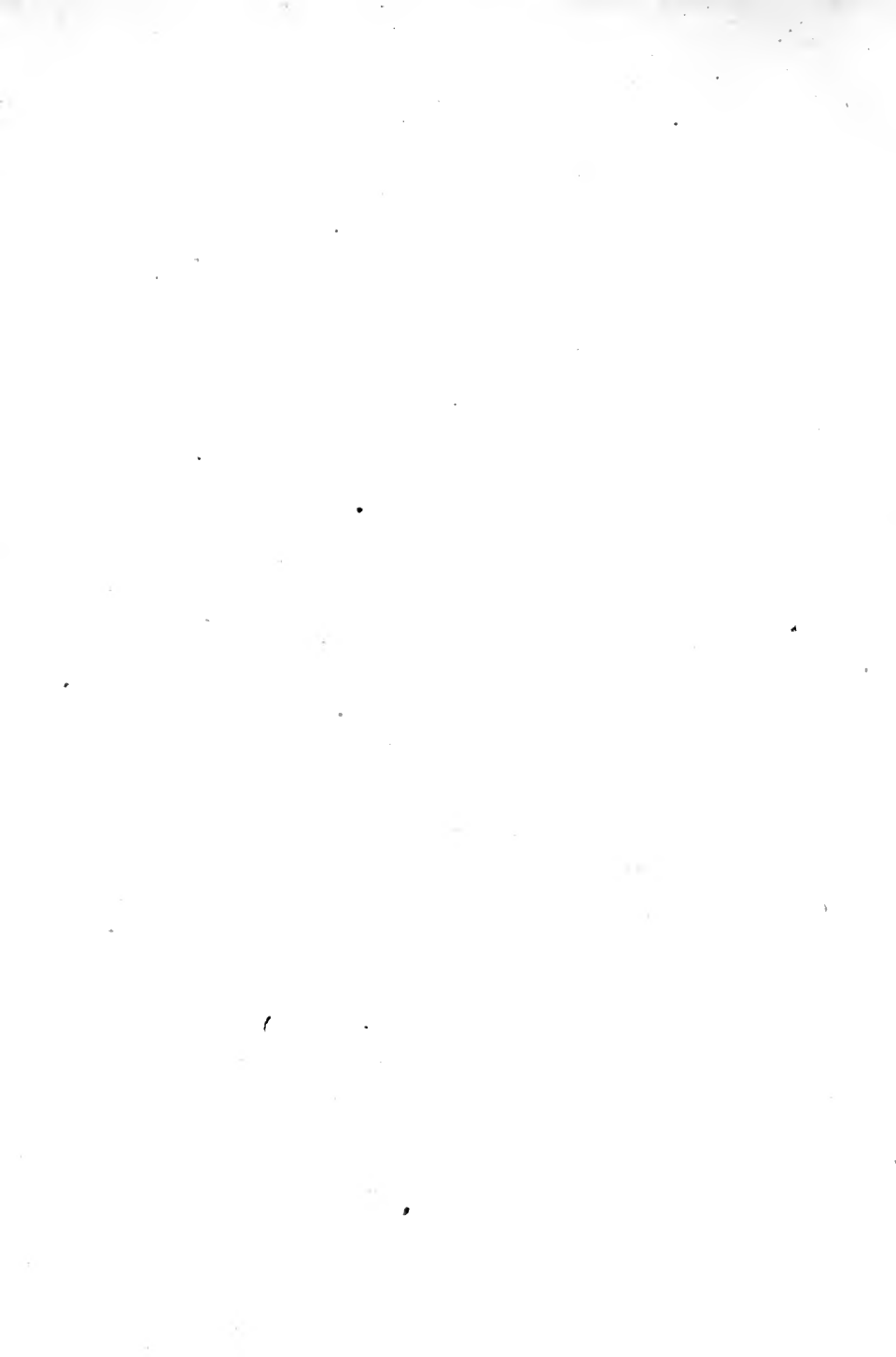








TEXT-BOOK OF LOGIC.



Philos.  
Logic  
W754

# LOGIC,

THEORETICAL AND PRACTICAL.

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## A TEXT-BOOK

FOR

TEACHERS AND STUDENTS,

BY


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## PREFACE.

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It is now some fifteen years since I published "An Elementary Treatise on Logic," which in its third edition is still before the public. I would not, however, have the reader regard this Book as merely a compilation, condensation, abridgement or re-arrangement of the former Work. On the contrary, it differs from it in many essential particulars.

Since the time of the publication of that Treatise, my attention has been chiefly directed to the study of the Principles and Forms of reasoning, as they occur in the actual practice of men who are engaged in the various intellectual processes that are called for in the prosecution of the affairs of life, and I am able to offer here a Work, which, I think, will be found, in many respects, to be especially worthy of attention.

It has been customary to regard Logic as a mere formal or instrumental science, dealing with "ideas," "notions" or "conceptions," as something intermediate between the mind that perceives and reasons,

and the substantial objects which it perceives and reasons about. I have fully adopted and *carried out* COUSIN'S declaration. "If by ideas is understood something real which exists independently of language, and is intermediate between the mind and things that exist, I say that there are no ideas. There is nothing *real*, except things and the mind with its operations." I hold, therefore, that Logic deals with THINGS, and not any mere fictions, under whatever name they may be designated, whether "ideas," "notions," "concepts" or what not. And it uses words as representing things; and sentences or propositions as representing the relations which things appear to sustain, to each other. What those relations really are, is a question that belongs to a higher department of metaphysics, Ontology. This view of the nature of Logic has enabled me to simplify my discussions of the Formulæ very greatly, to dispense with an immense amount of technicalities, and by constantly referring to *things* instead of mere "*notions*" about them, it has enabled me to make the general principles and laws of reasoning much simpler and more easily comprehensible.

This view of the nature of Logic and of the functions of language in relation to it has led to, and rendered possible, a much more satisfactory account of the Fallacies, especially those in Diction, than has hitherto been attained. I think I have *now* made



a classification that has enabled me to give an account of them that is clear, complete and satisfactory.

I have endeavored to be brief and concise. Perhaps I have sometimes gone to an excess in this direction. But I believe that obscurity more frequently comes from prolixity than brevity. And of all the features of a text book, no one that I have encountered, has been more vexatious to me than the mere verbosity which seeks clearness through a multiplicity of words. Few persons, I apprehend, will ever study Logic without a teacher, and the teacher, as I believe, will find here as much fulness as he will desire. And even for one that studies by himself; a clear, concise statement, with one or two well selected illustrations is usually better than more. He may find occasion to pause and think; possibly, to devise examples for himself. But he becomes in the end, a better master of his subject for this exercise of his own faculties. And in any view, and with any amount or kind of help, Logic—anything that deserves the name, and does its work—cannot be read like a new novel, for amusement or mere after-dinner recreation. In itself, it is the most abstruse, and, in one sense the most abstract of all sciences; for it is the science that is comprehensive of the first principles and methods of all others.

In the following pages, I have followed the old, or Aristotlian nomenclature, so far as I have had occasion to use any. I have given below, Part II, Chapter I, § 83, and Chapter II, § 140, my reasons for not adopting Sir WILLIAM HAMILTON'S theory of the Syllogism. It is but fair to say, however, that I have so far generalized the fundamental principles or dicta of categorical and comparative reasoning, as to provide for all possible cases, as I think; and I have in fact pointed out some forms that have not hitherto been recognized, so far as I know. And by referring each class of syllogisms or formulæ to that *relation of things, one to another, out of which the Forms of reasoning arise*, and on which they depend for their validity, I have been able, not only to dispense with a large amount of technicalities, dry details and specific rules that have hitherto been used, but also, so to state the principles of reasoning that they will be readily understood without a familiarity with those technicalities, and may be applied to all cases, if there be any, not contemplated in, or provided for by them.

And yet, these terms constitute a part of the history of the science, and are still in use and often met with in the discussions which are found more frequently in metaphysics and theology than elsewhere. I have, therefore, thought it best, and

no more than due to my readers, to introduce those terms pretty freely for the *sake of explaining them*, even when they not only were not of use to my purpose, but often when they were quite in the way; for I have thought that it would not be very satisfactory to any one to have studied Logic, and not have learned the meaning of the terms that have been used in the discussions of Logic. But as I have elsewhere said in the body of my Book, "Any one who will make himself thoroughly master of the Rules and Principles, which I have stated in common language and without technicalities, will hardly need trouble himself much about the details and technicalities of the Formulæ, since he can hardly expect to retain the latter, while the principles, once thoroughly understood, will remain with him forever."

In conclusion, I will merely add, that every term's experience, even now after twenty years, as a teacher of Logic, deepens my conviction of the importance of the study *as a means of mental discipline*. It may be that very few of the students of Logic can retain a recollection of its Formulæ, Terms and Rules so as to make conscious application of them in the mental work of their business of life. But as means of training one to a quick insight into subjects, a clear perception of important distinctions and a ready grasp of what is essential

while neglecting all mere accidental matter, Logic is, in my estimation, not only unsurpassed, but it is unequaled by any other branch of study. And even the Rules and Formulæ become transformed, as it were, into habits, and thus enable the mind to act with the quickness and certainty of instinct in the ever varying processes of reasoning which the performance of our duties in any station of life requires of us. Like the technicalities of Grammar and Rhetoric, they may all be forgotten while the habit of correct and ready speaking, which they contributed to form, remain as long as the mind itself retains its activity.

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# PART I.

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## *INTRODUCTORY.*





## INTRODUCTION.

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### NATURE AND SCOPE OF LOGIC.

1. Man depends for all he knows upon OBSERVATION and REASONING.

(1.) *Observation*, which consists in the exercise of (1) Sense-perception, as sight, hearing, etc., for all objects in the outward or material world, and (2) Consciousness for all the facts and phenomena of the activity of the mind within. But along with observation there is an Insight which is a process of *seeing into* the nature of the objects and phenomena which are seen or known by Perception and Consciousness. By this means, and by this alone, apparently, are we able to reason, and by reasoning to come to know more than the brutes, and to rise above them in the scale of intelligence. It is doubtful whether Insight gives us, *immediately*, knowledge of any objects which had not been cognized otherwise, that is, by Perception or Consciousness; but it discloses to us their nature.

(2.) *Reasoning*. This is the process by which we pass from observed facts and objects to general principles and laws; and in many cases we come by this means to know the existence, nature and relations of objects which are not immediately subject to observation. Reasoning is always carried on by means of Insight, and

begins where Observation ends. In fact, what I have called Insight is often called Reason, and thus the relation of the two, Insight or Reason, and Reasoning, is made conspicuous. And in this view, that exercise of insight which is involuntary, follows upon and accompanies every act of perception or consciousness and of which, for the most part, we are conscious at the time, we call Reason or Insight; and the exercise of the same faculty, when we become conscious of its exercise, and when, therefore, its exercise passes under the control and guidance of the will, we call Reasoning.

2. No two persons ever begin to observe and think without differing in the statement of the results of their mental activity—even if they do not differ in the results themselves. And nothing is more natural and nothing more sure to occur at an early stage of our existence, in fact, before infancy and childhood will have passed away, than that we shall begin to dispute, to argue, and to try to refute and convince one another. Sometimes one will succeed and the other acquiesce. But it will often happen that neither is convinced, and that we shall disagree as much about the validity and the value of the arguments that have been adduced, as we did about the original proposition. This naturally leads to a consideration of the reasoning itself. And then we have a beginning of the *Science* of reasoning—Logic; or at the least the sense of the want of such a science.

3. But the science thus originating is rather Dialectics and the science of controversy than Logic properly so called. Logic comes in only as subsidiary and very subordinate. The result would be a compound of Rhetoric and Logic, for as Whately has tersely said, "Rhetoric invents and arranges arguments, Logic criticises them." Hence, as human culture advances the want is felt of

some science of reasoning totally independent of any subserviency to the mere conducting of a controversy, which shall give an explanation of all those measures and thoughts and influences that intervene between simple observation and the highest results to which the human mind ever attains—a science which gives us truth; and assists us to assert and maintain it, only as it shows us what it is and how to prize it.

4. The history of the science is conformable to this theory. The first writer on Logic, as Aristotle says, was ZENO the Eleatic, who flourished about 475—300 years B. C., just after the uniting of the disciples of the two great schools of Magna Grecia and Asia Minor at Athens; and after the transfer of the seat of Greek philosophy to that section, had led to the discussion of the various and conflicting tenets of those two early philosophic evolutions. But his work, as Aristotle characterizes it, and as we know it from the remnant of it preserved by Diogenes Laertius, was rather *Dialectics* than *Logic*.

5. ARISTOTLE saw the difference between the two, and wrote what have since been called his *Logical treatises*; consisting of the *Categories*, the *Prior and Posterior Analytics*, the *Topics* and *Sophistical Elenchi*, in which he has included much of *Grammar* and *Rhetoric* as well as *Logic*.

6. During the intervening ages, until since the revival of learning, the science was sedulously studied indeed; though little was done besides elaborating and applying what the Stagirite had written. At the time of the Reformation the deductive method, or the method of demonstration from mere definitions had been so extensively brought into use, that it was thought to be the only method that *Logic* could afford, or know anything about.

It was characterized as the Scholastic method. The students of the natural sciences, among whom as an expounder of the method, the name of BACON stands pre-eminent, disliking the scholastic method, inaugurated the inductive method; and the study of Logic fell into disrepute with that class of men, and its use, or rather the use of its terms and formulas, was left to the theologians and philosophers.

7. About the beginning of this century, ARCHBISHOP WHATELY wrote two treatises, one on Logic and the other on Rhetoric, which have done more probably, than all other causes put together to restore the study of Logic, and to put the science itself in a proper light. The books are remarkable in their character, of great value, doubtless, and the student who has thoroughly mastered them knows something of Logic and a good deal of Whately. His work on Logic was assailed by Sir WILLIAM HAMILTON, first in the *Edinburgh Review* for April, 1833, and the paper is reprinted in Harper's Edition of Hamilton's Works, Ed. 1853. In this Review Hamilton handles Whately very severely, and proposes a new theory of his own.

8. But since the publication of Whately's Treatise, the amount of attention to the subject has greatly increased and we have had works almost without number published for the purpose of improving and advancing the science, and bringing it within the reach and practical use of all educated persons. In France and Germany also, nearly if not quite every school and evolution in philosophy has had its Logic. And in Hegel we find it assuming the proportions of "the universal science;" not one among many only, but that which comprehends them all. One of Hegel's disciples has represented his views of the science in these words: "The domain of

Logic, says Hegel, is the truth as it is *per se* in its nature and character. It is the representation of God as He is in His eternal being.”\*

9. I propose, however, in the following pages a much more modest and unpretending view. I propose to view Logic as I have defined it, as the science of reasoning; not Dialectics, not the science of disputation or discussion, but as the science of the methods of attaining truth. I shall hereafter† notice the basis of Hamilton’s theory and give my reasons for not accepting it as an occasion for abandoning all that had been done before him from Aristotle down. Notwithstanding, it must be admitted that Sir William’s presentation of his theory has occasioned some modification of the statements that will hereafter be given to the science.

10. It falls within the province of *Psychology* to describe the faculties, functions and laws of Observation and Insight, the extent to which and the limits within which they may be trusted; and the nature of the knowledge which we have from their exercise. It is the province of *Logic*, on the other hand, to explain the processes and laws of Reasoning, or that voluntary exercise of the mental faculties by which we proceed in the manufacture of the raw material of knowledge—if we may use such an expression—given us by Observation and Insight, into those general views, principles and laws which make up the mass of our knowledge, our science and our wisdom or practical skill.

11. I have thus far spoken of *Knowledge* only. We have besides this much of what is commonly and properly called *Belief*. For this we depend on testimony,

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\*Schwegler’s History of Philosophy. Appleton’s Ed. p. 346.

† Part II, 84, 140, 149.

and this testimony may be either ordinary human testimony in regard to matters which have fallen under other men's observation, or it may be Revelation in regard to things divine.

12. This difference, however, serves to distinguish Belief from Knowledge; namely, into Knowledge there enters no voluntary element, whereas, in all Belief there is always a voluntary element. If I see an object before me, I know it to be there and cannot but believe it to be there, and to be what I see it to be. I have no choice about it. Even in the case of hallucination, we have no power to distrust our faculties. We know we see the object although we may know at the same time, by other means, that there is no such object seen. But in Belief, if we choose to place confidence in any witness; we believe on his testimony what he says. Or if we choose to distrust him, we do not believe what he says. Whether, therefore, we believe or not, depends very much upon choice—whether we choose to place confidence in the witness or not: and this is as purely a free moral act as any other that man can perform, or ever refuses to perform.

13. Undoubtedly, testimony has its laws and conditions, and there are cases in which it becomes so strong and so circumstanced as that we do not hesitate, and in which we ought not to hesitate to place confidence in and accept what is thus declared to us with as much assurance and with a compliance as unhesitating in our actions as though the matter were one that depends upon our own personal observation. And in fact the whole discussion of what is called “the Evidences of Christianity” is a discussion of the testimony on which we ought to accept what is taught us in the Bible as a Revelation from God. But the consideration of Testimony

does not properly fall within the province of Logic. It is in fact a science by itself, and must have special rules and canons in each of the various departments of inquiry; and in the department of Law it has been especially elaborated and reduced to system.

14. The distinction which I have pointed out is not always observed, and much of what we actually receive on testimony enters into what we call our knowledge; and both facts and principles which rest on this basis, enter with those based on observation and insight, into what I have called the raw material, with which our logical processes begin. And after they have been thus blended and combined, no further notice is taken of the difference between them for any of the purposes or processes of Logic.

15. Logic is the Science of Reasoning; and in the word "reasoning" I include all the forms of mental activity that follow upon Observation, and intervene between it and the most general principles and the most comprehensive truths at which the human mind ever arrives. A fact must precede in the order of time the science that explains the fact. Men must have reasoned before they had a science of reasoning. The very construction of a science is, itself, an exercise of the faculty and process of reasoning. And hence Logic cannot be an explanation, or inculcation and demonstration of any one way or mode of reasoning; it is, and must be an explanation of all the modes and methods of reasoning.

16. Recurring now to the nature of Observation, we see that we observe facts one by one, and as individual objects. I may see, for example, a dozen objects on the table before me at one and the same time, and these objects *do* undoubtedly make a group or collective whole, and they make a class or genus; but I see them, one by

one, individually, and as detached individuals. And if our intellectual action were to go no farther but end here, we should have no science, no language—we might have sounds—one for nearly every object, but we could have no adjectives—no common nouns—most likely, no verbs, and, at any rate, no sentences, or propositions.

17. The first act after observation is called *Analysis*. Real analysis, however, is, as its etymology imports, always physical. By it we resolve water for example, into oxygen and hydrogen; sugar, into oxygen, hydrogen and carbon. In all these cases, the parts or elements, into which the object is resolved by analysis, are substantial realities, and are denoted by nouns, which, as grammarians, we call concrete terms. But in what is called *logical analysis*, the case is otherwise. We *suppose*, in accordance with an old theory of ideas, that the object is made up of certain properties, essences or *entia rationis*, so that, by analysis, we can separate these properties, one from another. What we actually *do*, however, in a logical analysis, is to think of the object as made up of properties, and then resolved into its ultimate elements. And what we thus (by supposition), obtain by logical analysis, are only the properties of objects, and they are always denoted by what grammarians call *abstract*, terms, as whiteness, roundness, solidity, etc. Ontologically, as existing by themselves, they are nothing, and cannot even be thought of as existing distinct from their substance. Solid objects exist; but solidity does not.

18. The next step is *Abstraction*. By this in one view of the word we *draw away one property* of an object to make it a special object of thought. But in a more correct view of it, we *withdraw the mind*, from thinking of any but one of the properties of the object, which



property we are supposed, as described before, to have separated from the rest by analysis. This process of abstraction is the origin of what are called abstract terms.

19. And now occur two other processes—both of which are synthetic in their nature; and although they are different, they can hardly be separated, so that the one of them can be performed without the other. They are *Judgment* and *Generalization*.

20. By an act of Judgment, we form a sentence or proposition, in which a word denoting the object constitutes what is called technically the *subject* of the proposition, and some other word called by grammarians an adjective—denoting a property of it, (which word—we had obtained by analysis,) is made what we call the *predicate*, as “snow is white,” the verb “is,” being regarded as the *copula*. Hence, a Proposition consists of a subject, a copula and a predicate; and the act of judgment is that synthetic act of the mind by which we affirm the agreement between the subject and predicate of the proposition. Hence the subject is the result of observation, the predicate, of analysis, and the copula, of judgment.

21. But the property which we thus affirm of any subject, is a property of other objects also besides that from which we obtained it by abstraction, and is in fact obtained by abstraction in like manner from a great variety of other objects—as “whiteness” from snow, from paper, linen cloth, from petals of flowers, etc., etc. Now in the very act of judgment we are forming a *generalization* also; that is, we are referring all objects that are white, and from which whiteness may be obtained by analysis, to a class, and are grouping them, (in thought,) into what is technically called a *genus*, and hence the

word "to generalize." And the property which we thus make constitutive of a genus, we call the *essential* property, the one which makes the class to be a genus—the only one that is distinctly seen to be common to all objects in that class.

22. For the most part, however, in generalizing, we make several of the most prominent and obvious properties *Essentia*, as we call them, and perhaps without exactly discriminating or noting them separately. We denote the group or class of objects by a general term; called general, from the fact that it denotes a genus, and is obtained by the process of generalization. As examples we have in fact all the common nouns in a language, as man, horse, pen, house, etc. Any of these common names or general terms may also be used as predicates, as, "dogs are animals," "horses are quadrupeds," etc., etc.

23. Having thus formed or grouped objects into genera, we next divide them into smaller classes called *species* or kinds; and the properties by which we distinguish the species one from another, we call by the technical term, *Differentia*. Thus we divide man into species, as Negro, Mongol, Caucasians, we divide horses into species and call the different kinds of horses by different names, as Arabian, Blood, etc. The properties which distinguish one individual from another, we call *Inseparable accidents*, or *Individual marks*; and those which distinguish any state, mode, or condition of any individual from another mode or state of the same individual, we call *Separable accidents*, as sickness or health in man, warm and cold, etc., in nearly all the objects we know of.

24. It is obvious that there is no one property that is always either *Essentia*, or *Differentia*, but all properties are in turn one or the other, as we choose to use them

for the purpose above indicated. Even the properties which are for the most part regarded as accidental, as sickness or health, become essential when we speak of the sick as a genus, and divide them into different species, as those that are sick with one or another of the various kinds of disease. Or sickness becomes a differentia when we distinguish the genus Man into the two kinds, *sick* and *well*.

25. Hence any property is said to be (1) essential to the individual object when it is inseparable from it or cannot be separated from it without changing its identity, (2) essential to a species when it is one of the differentia of that species, and serves to distinguish it from another species, and (3) essential to a genus when it is one of the properties that include objects in that genus. But when a property does not perform one or another of these functions, it is regarded as accidental.

26. It has not been customary, however, to include all the mental processes above described, nor in fact any of them except one, within what has been considered to be the province of reasoning. The term has been used for the most part in a more restricted sense, to denote the mere processes of inference or deduction. Hence a very great mistake as to the nature and scope—and we may add the *utility* of Logic. Many writers claim that Logic applies to and can explain only a small part of our reasoning processes, so that, in fact, by far the largest part of the opinions we hold and act upon cannot be subjected to logical criticism, reduced to or judged of by the formulæ and principles of Logic. There are those who hold that all our higher convictions of religion and duty are of this kind. And again, another and more common misapprehension is that Logic is but *one* mode of reasoning, and is “reasoning by mood and figure,” as

the expression is—a method that is very stiff, awkward and incapable of accomplishing any good result that cannot be better and more easily accomplished without it.

27. But Logic really begins where Psychology ends, and the two together explain all the processes from first to last; and whatever is true and leads to a correct result must be in accordance with the principles which they teach. Logic is the process in which from two propositions considered as, and called *Premises*, we infer another called the *Conclusion*, which is true if (1) the premises are true, and (2) the process or inference is valid. *The Conclusion can, however, contain no term or word that was not in the Premises.*

28. From what has been said of the science of Logic, its scope and its aims, it must be manifest that a thorough mastering of it, if such a thing be possible, will be of great use to every one as an instrument and means of scientific investigation in search of truth, and in presenting and proving the truth to others. It will not only point out the right way and put one on his guard against the dangers of the way; but it will put him in possession of a knowledge of the ways and means so as to enable him to abridge his labor and save his time and strength to a great extent. It will enable him to know what he knows, and thoroughly to understand it.

29. And yet Logic is, after all, like mathematics, grammar, etc., chiefly an instrumental science—of no great value in itself, and valuable chiefly as it is a means to that which is valuable in itself and which can be better obtained with than without it, even if it never helps us to anything that cannot be obtained without it.

30. It is not to be expected, however, that one who has studied Logic will be always stating his arguments in the complete formulæ or pointing out their character

in the use of logical terms and technicalities ; any more than it is expected that one who has studied grammar will be always parsing his sentences or citing the rules of etymology and syntax that justify the structure and turns that he has given to them. But, like grammar, it will help him to speak without violating its rules, and thus render himself intelligible and conclusive in his reasoning.

31. Besides this, as in grammar, and in fact in all other sciences so in Logic, technical terms and names for all the objects and parts of objects we have to deal with are necessary in order to discuss arguments—to talk about them, point out their defects if they have any, and to show wherein and why they are of force if they are valid. The science, however, makes no claims to supply the place of insight, sagacity and tact. If these are wanting, it can do nothing for us. It may help us as spectacles do defective eyes. It may also serve as a microscope to render visible objects that would otherwise pass unnoticed ; or as a telescope, to bring into view what were otherwise too distant for vision. But, after all, it is only a means or instrument. Natural insight, sagacity and comprehension are gifts and faculties that it aids but cannot replace.

32. If, therefore, one believes or assents without reasoning, it may be a mere matter of observation and insight. Or it may be a mere matter of feeling and willfulness of which perhaps no account can be given. But if he believes as the result of reasoning, Logic must explain the process. In all *knowledge*, therefore, in fact in all *rational* belief, we have these three: *Observation, Insight, Reasoning*. The first of these is Observation ; the last is *Reasoning* ; but the greatest is INSIGHT.

Now, if one believes or assents without reason, or

reasoning yet even then, Logic will develop that fact and show the unreasonableness of the course by showing what absurdities are involved in the opinions which those who proceed in this manner profess to hold.

33. Reasoning in reference to its *method* is of two kinds, *Analytical*, called also *a priori*, or demonstrative—which is reasoning from the *nature* of the subject, and *Synthetical*, called also *a posteriori* and deductive, which is reasoning from the *relations* of the subject.

34. Analytical reasoning, begins of course with logical analysis, and it takes its name from the notion that by unwinding or unfolding the conception of the subject we find the predicate we wish to affirm of it, either obviously contained or necessarily implied in the nature of the thing itself. Thus, by considering a straight line we see from its very nature that it must be the shortest line that can be drawn between two points, and that it cannot enclose a space. All mathematical reasoning is of this kind, as we shall see more fully by-and-by.

35. This kind of reasoning is called *a priori*, because it proceeds from the very idea or conception, or what we are supposed to know of the thing itself before any observation or experience concerning it.\* It is called *demonstration*, because it begins with, and proceeds by means of, what is self-evident, needing no proof, and shows the conclusion to be true in the very nature of the subject.

36. Synthetic Reasoning is called *a posteriori*, because

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\* “Reasoning is sometimes said to be *a priori* because it is reasoning from cause to effect. *Whately's Rhetoric*, Pt. I, Chap. 71. § 2. The ambiguity is undoubtedly inconvenient; but it is too late now to correct it. Whether we have any ideas or conceptions of things before observation or experience, may be a matter of doubt, and in fact is disputed and denied. But that we have “ideas” as they are called, of things which we have never seen, by means of their definitions,

it is based upon an examination of the relations and connections of things, which relations—or rather our knowledge of them, must be, for the most part, posterior to the cognition and observation of the objects about which we reason.

37. The relations of things, one to another, on which our reasoning about them depends, are four.

(1.) The relation of QUALITY or of classification. It depends upon the fact that every object of observation or of thought even, is an individual in a species, and that that species is a class in a higher or more comprehensive class, called a genus, and so on, up to the highest and most comprehensive class—a class which comprehends all things and has but one attribute common to them all. It is called the relation of quality, because it depends upon and shows *what* a thing is.

(2.) The relation of QUANTITY. This may be (1) simple extensive quantity as greater or less, as in Geometry; it may be (2) numerical quantity, as in Arithmetic or Algebra; it may be (3) quantity of time, as before and after in History; it may be (4) quantity of space, as more near or more distant, as in Geography and Astronomy; it may be (5) quantity of intensity, as when we say of the weather, it is warmer or colder, or of a color, it is darker or paler; or it may be (6) a comparison of ratios, as, when we say  $2 : 3 :: 4 : 6$ , or  $3 : 4 > 2 : 3$ .

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can admit of no doubt. The mathematician reasons concerning a curve, the exact representation of which he has never seen. And in all cases we form "ideas" of things from which we reason *a priori*, to properties and relations concerning them, which have never yet fallen under observation and which perhaps never can do so. Such is the case with regard to the infinite divisibility of matter, and the law of motion, which asserts that a body in motion, with nothing to obstruct or retard its course, will continue to move on forever.

(3.) The relation of CAUSALITY—or of cause to effect. Everything that we see, and everything that we think of except ONE, is regarded as an effect of something else, and everything without exception, is also regarded as a cause. Everything within the reach of human thought is bound in the chain and concatenation of causality. The cause is always some proof of the reality and of the nature of the effect, and conversely the effect is proof of the reality of the cause, and discloses to us much of its nature.

(4.) The relation of TOTALITY. Everything we see or can think of, is part of a complex whole—not merely an individual in a species, but a part of a whole. Not only a letter in a word, a word in a sentence, but the features on the face, the rocks and trees in the landscape, the stars in the constellations of heaven, nay even the constellations themselves, are all parts of more comprehensive wholes, whose relation to the whole and to the other parts, is a means of reasoning and of knowledge in regard to the whole which they make up, and to the parts which, with them, make it up.

38. Demonstration or reasoning from the nature of the subject, must always precede Synthetic or Deductive reasoning in the order of time. And although its validity does not depend upon the Formulæ or Syllogisms in which it is stated, it is nevertheless always in the same form as the reasoning from the relations of things. We will therefore proceed first to consider these relations and the Formulæ that grow out of them.

39. I think that it will be obvious from our review of the Nature and scope of Logic, that it comes within the province of that science to discuss all the processes and means of knowledge and belief except what is included in Psychology. There are, however, writers who hold



what indeed is a very common opinion among uneducated people: that Logic is only *one method* of reasoning among many; or, as some would represent it, it is only a mode or form of stating arguments; and, there is still another class who seem to think that it is a science which is to furnish us with a certain dexterity in the use of general principles, formulæ and technicalities, by which we can always at least confound an opponent if we cannot make the worse appear to be the better reason.

40. But the view I take of the subject is far different from any or all of these. It is no one mode of reasoning; it is rather the science that explains all modes that are at all valid or legitimate. It is not a mode or form of stating arguments, although it discusses all the modes and forms in which valid arguments can be stated. And yet the most skillful logician and the most thoroughly trained mind—which is always the most logical mind—will be the least likely of all, perhaps, to state its arguments in the use of technicalities or with an obtrusive display of formulæ. And, of course, Logic includes all subjects of thought, knowledge, opinion or belief; for it begins with logical analysis, explains judgment and gives the terms as well as the processes of inference. But acts of mere imagination and fancy it does not explain. It is no treatise on poetry and the fine arts, and is not very poetic in its character. But if there be an object in existence or out of it, of which we *know* anything, or about which we can make *any affirmation*, that object falls within the nature and scope of Logic.

41. What is commonly called an argument usually extends through a book or discourse consisting of many smaller arguments or formulæ called syllogisms. These syllogisms are the “little steps” of reasoning, out of

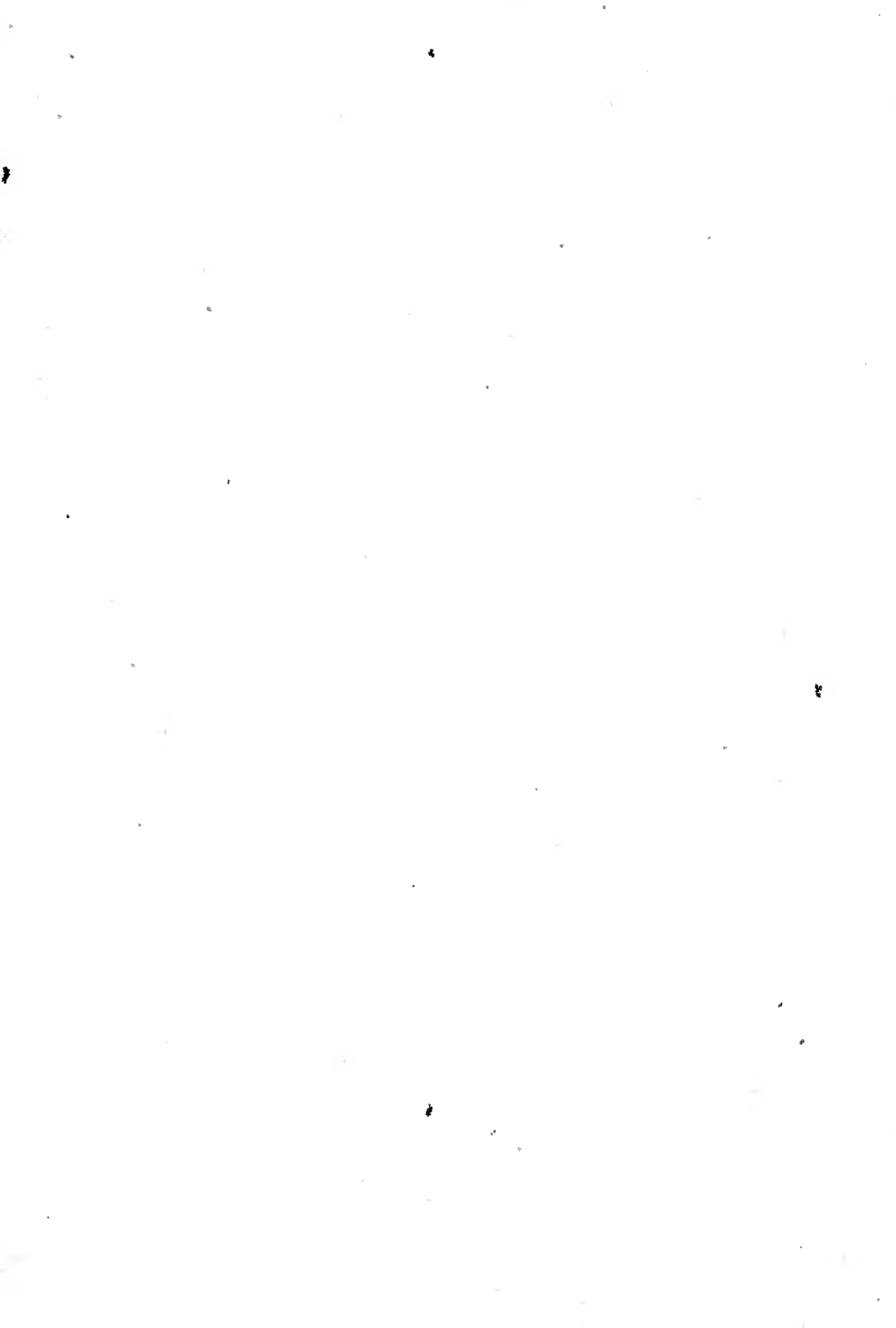
which the discourse or argumentative treatise is made up. Any fault or fallacy in these, or in any one of them, will therefore vitiate the whole. And yet it is very seldom, if ever, that these syllogisms or formulæ are fully and formally stated. Each one of them must of necessity have two premises besides its conclusion, thus making three propositions in all. But in a continual argument it is very seldom that both premises are stated, one being assumed as too well known to need express mention. And quite often the conclusion even, is not stated, but implied rather and assumed as a basis or condition of proceeding with the next step in the course of the reasoning.

42. Now it happens that the fault of a general argument or course of reasoning often lies in these assumed, but not expressly stated propositions, whether premises or conclusions. But, of course, we have no way of finding what these propositions are, except as we complete the formulæ or syllogisms of which they are part. It is a sort of an evolution process by which we find the root of a given power. It is a reconstructive process rather by which we restore from a few fragments a completed whole, just as some skillful anatomist from a few fragments of fossil bone can reconstruct the entire skeleton of the animal to which they once belonged.

## PART II.

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*THEORETICAL.*



## THEORETICAL LOGIC.

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### *ANALYSIS AND CRITICISM OF FORMULÆ.*

43. There has been much dispute as to whether Logic should be regarded as an art or as a science. If it is a science only, and as a science, it should teach principles and truths concerning reasoning. If it is an art, and as an art, it should teach the application of those principles and truths. The teaching of the application without the previous teaching of the principles would, at most, make one a mere contemptible pettifogger; and the teaching of the principles without, at the same time, their practical application would be of no great value. The last without the first would be but half of what any student should know: the first without the last would not be worth knowing at all, and in fact, could not be said to be known or understood in any proper sense of the word.

44. The simplest steps or processes of reasoning, as I have already said, must either be, or imply, a form or formula, called a syllogism. The number of possible forms that have validity is definite, well known, and each one of them may be described; and the principles on which their validity depends may be fully and satisfactorily set forth.

45. These syllogisms, however, are but the "little steps"

of reasoning; the moulded brick or rough ashlers of which argumentative discourse is made up; and their construction into a discourse or their use in proving a proposition depends upon entirely different principles. The validity of the syllogism depends upon principles derived from the relation of its parts one to another; the method of their application depends upon principles derived from the nature of the subject matter to which they are to be applied and the circumstances under which the application must be made.

Hence I divide the work before us into two parts, 1st, theoretical, treating of the formulæ and their validity, 2d, practical, treating of the methods of their application to the various uses and purposes of life.

## CHAPTER I.

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### THE LOGIC OF PROPOSITIONS.

46. Knowledge begins with the perception of objects. These objects we see individually, and one by one. By analysis and observation, we think of their properties, and those properties are denoted by adjectives, (the objects being denoted by nouns), which we can predicate of the object, and thus instead of names of things, we have propositions or affirmations concerning them. With these propositions begins what is commonly regarded as the process of reasoning.

47. The predicates that are thus obtained, are all adjectives. It is manifest, however, that we may also predicate of any noun any other noun that denotes a class in which the object denoted by the subject of the proposition is contained. Thus, "John Doe is a man," "Horses are quadrupeds," etc. In fact the predicate, which in this case is a general term, denotes a genus by the properties that are common to all the individual objects in the class. Hence, in the former case, that is, when the predicate is an adjective, we are said, in scholastic language, to *predicate the species*. But in the latter, when the predicate is a common noun, we *predicate the genus*; the predicate denoting a class in which the subject is comprehended.

48. Hence, for present purposes, we may regard it as

altogether immaterial and unimportant whether the predicate be an adjective or a common noun. But one or the other it must be, unless the proposition be a mere verbal definition. In this case, the subject and predicate are both merely different names for the same thing, denoting it by what are called alternate conceptions of it, as "common salt is chloride of sodium;" the former term denoting it by its position in common use, the latter by its chemical composition. Again, "the Queen of England is Victoria;" the former denotes her by her office, the latter by her personal name.

49. And in fact, we may regard all the words used to denote or describe the subject of a proposition, as but one word—a compound word—making what we call a complex term. In this view, the simple term, or common noun denotes the genus, and the adjective or relative clause will limit the assertion to some part or species of the genus. Thus, "*good men*," "*cold winds*," "*men who follow Mahomet*,"—Mahometans, etc., etc.

50. In the same way, all the words that make up the predicate may be regarded as one, for logical purposes, however compounded or complex it may be, and it will be none the less either (1) an adjective denoting a property of the object denoted by the subject of the proposition, or (2), a noun denoting a class in which it is contained, as "*good men are faithful to their trusts*." Here, "*faithful to their trusts*" is virtually an adjective denoting a property or quality of "*good men*."

51. In reference to what is called the quantity of the proposition, it is obvious that it may be either (1) *individual* and affirm a predicate of an individual object, (2) *partial*, affirming the predicate of some objects making part of a class, or (3) *general*, affirming the predicate of a class to which there may be individual exceptions, and



(4), *universal*, affirming the predicate of a class to which there are no exceptions.

52. The two last named—general and universal—are not distinguished from one another in form at all, and the difference between them is found in the subject matter of the propositions. Thus, if we say, “men are rational beings,” the proposition is universal, in form, but there may be exceptions, as in the case of idiots, who are not rational, though I presume no one would deny that they are men. In fact, there are, or at least, may be exceptions to all the propositions, however general in form that are proved by any of the *a posteriori* methods; that is, any of the methods that proceed from observation and by means of induction and generalization. But if we say, “all triangles have three sides,” or “in all triangles, the length of one side is less than the sum of the other two,” we have a universal proposition to which there can be no exception. And this is the case with all propositions that are proved by *demonstration* and *a priori*. (See Part III, Chap. II, Sects. V and VI.)

53. But for all present purposes, we will leave this difference out of sight and proceed to consider the propositions as one, and call them, as writers on logic have always done, universal propositions.

54. Any proposition is regarded as individual when the subject is either (1) a proper name, as John, Thames, London, etc., or (2) any common noun with the pronouns, “this,” “that,” or the definite article “the” with a relative clause following, as “the man who did this,” etc.

55. An individual proposition is, for all the purposes of formal logic, or the discussion of syllogisms, to be considered as a universal proposition; in as much as it always speaks of the subject as a whole. We have, there-

fore, really to consider only the two kinds so far as Quantity is concerned, namely, Universal and Partial.

56. But in reference to what is called the *quality* of propositions, there may be three kinds. (1) The proposition may be *affirmative*, and include the subject in the the predicate as a class, as "horses are quadrupeds," or (2) it may be *negative*, and exclude the subject from a class, as "horses are not birds," or (3) the proposition may be what is called *indefinite*, that is, affirmative in form, and negative in force; as when we say, "men are *immortal*." The predicate being a negative term denotes as such, no class, while the proposition is equivalent to "men are not mortal," in which the subject is excluded from the class denoted by the predicate. However, the indefinite and the affirmative propositions are to be considered as the same for our present purposes, and we have in relation to Quality but the two kinds, Affirmative and Negative. Or combining quantity and quality, we have four, namely, Universal Affirmative, Universal Negative, Partial Affirmative, and Partial Negative. These propositions are, for the sake of convenience, called respectively, A, E, I, O, thus:

All S are P,	. . . . .	A.
No S are P, or S are not P,	. . . . .	E.
Some S are P,	. . . . .	I.
Some S are not P,	. . . . .	O.

57. If we regard the form of propositions alone, as that upon which their force and efficiency for categorical reasoning depend, it is evident that there can be but these four kinds of propositions. If we speak of any thing, we must (1) speak of it either as a whole or of some part of it. In the former case, the proposition is universal, in the latter, partial; and we must (2) either affirm or deny something of that of which we speak,

whether it be a whole, or only the part of some thing. In the former case, the proposition is affirmative. In the latter, it is negative. Hence, combining the two conditions, we have A, E, I, O.

58. These propositions grow out of and sustain most intimate relations to classification.

59. Every object in nature is one—an individual—and is included in some class. Hence we have such words as “chairs,” “pens,” “tables,” “horses,” “dogs,” “crows,” “wrens,” etc., denoting classes of objects. Any two or more of these classes are combined into a higher class, and we have such words as “furniture,” “quadrupeds,” “birds.” Two or more of these are combined, and we have such words as “animal,” “vegetable,” etc., and thus on until we come to a class called the *sumum genus* which includes all things, and has no name.

60. The lower term, that is the common name that includes the fewest individuals, so that there is no term between it and the individual name, is called the *infima species*; and any other class is called a *species*, if it be considered as included in a higher and more comprehending class, or a *genus* if it be considered as comprehending other and smaller classes. And those in the order ascending from the individual name up to the *sumum genus* are called *subalternate* terms. Thus, let N denote an individual, and we have N, dog, quadruped, animal, etc., forming a series of subordinate or subalternate terms.

61. But at each step we have two or more classes uniting to form a class above, thus:

Quadruped,	} Animal.
Bird,	

That is quadrupeds and birds are both animals.

62. Any two words which are in different lines below

that in which they unite as "animal," are called *co-ordinate* terms, as "quadruped" and "bird" are co-ordinate.

63. The test of co-ordination is this: no one object can be in more than one of the classes denoted by any pair or set of co-ordinate terms. And any two or more terms that have no individual common are co-ordinate.

64. The class next above any two or more co-ordinate terms in which they unite is called in reference to them the *proximate* genus.

65. It will be very easy for any person who chooses to do so, to make for himself a table or diagram that will illustrate to the eye the principles of classification. It would be something like the numberless springs issuing from the mountains and hill-sides that surround and form the boundary of any great river basin. Each spring is an individual object. Two of them unite and form a rill or stream; a few of these streams unite and form a creek; the creeks form a river, and several rivers unite in their courses to the ocean. In the same way, the twigs of a tree unite to form a branch; a few branches form larger branches, and these, at last, unite in the trunk or main stalk. So objects unite to form species, species form genera, genera unite in still higher classes, until we reach the summum genus, which includes, *in fact*, all things that are real. And, *in theory*, and for certain purposes of discussion, it is supposed to include all things imagined or imaginable as well. And the terms are called higher or lower as they stand in this order nearer to the name of the summum genus on the one hand, or to that of the individual object on the other.

66. From the nature of classification it is obvious that,

(1) The lower the term the fewer individuals it will include.

(2) The higher the term, the fewer the properties by which it will denote them.

Thus the word "dog" includes fewer individual objects than "quadruped," or "animal"; but it describes those objects more definitely; that is, it ascribes to them more properties.

67. But besides this, there is no one object or class that is not included in several classes which are neither co-ordinate or subalternate. Thus, sulphur is a "drug," it is a "mineral," etc., etc., and yet not all drugs are minerals; nor are all minerals drugs. That is, "mineral" and "drug" are not terms in the same line or ascending series; nor yet are they co-ordinate terms; and we may represent their relation thus:

$$\text{Sulphur} \left\{ \begin{array}{l} \text{Drug.} \\ \text{Mineral.} \end{array} \right.$$

The terms "drug" and "mineral" are called *alternate* terms, and they differ from co-ordinate terms in the fact that they always have one or more individuals common to them all; as in the above example, the same thing is both a drug and a mineral.

68. Again, the same genus may be divided into species in reference to different tests or properties as differentia. Thus, we may divide man, in reference to religion, into Jews, Mohametans and Christians; in reference to race, into Negroes, Mongols, Caucasians, etc. The terms produced by these co-ordinate divisions, as Negro, Mongol and Jew, are called *disparate* in reference to each other. No affirmation can be made between them; no inference can be drawn from them.

69. Thus, the principles and the processes of classification are essential to all knowledge, and enter into all the

processes of understanding and comprehension as well as into those of reasoning—all I say, after the very first, which is mere observation, and which the animals perform, as well as man. These principles are very simple, and when once understood, all the necessary axioms or maxims of reasoning become self-evident.

The principles of division are also implied in classification.

70. There are three kinds of division. (1) *Numerical*, in which we divide, as in Arithmetic, mere numbers, (2) *Physical*, in which we divide any individual object into parts, as a loaf of bread, into slices, and, (3) *Logical* division, in which we divide genera into species; species, into individuals, and then, when logical division can go no further, physical division begins.

71. Logical division can go no farther than the individual, because in dividing the individual, we resolve it into parts and destroy its individuality. A man divided into parts would be a man no longer. Nor could the parts, each and separately, be called a man; they are merely parts of a man, and as such, would be called hands, feet, etc., etc., but not men.

72. Those classes in which the same individual object is included are called *alternate* species, whereas those which have, and can have, no individual in common are called *co-ordinate* parts or species.

73. In division, we have several self-evident axioms.

(1) The whole must be greater than any one of its parts.

(2) The sum of the parts must be equal to the whole, whether we count them and reckon them by number or weigh them for example, and compute them in units of weight.

(3) In logical division, moreover, it holds that no in-

dividual can be in more than one of the co-ordinate parts. But in regard to alternate species, this last rule is reversed, and one individual at least, is always included in more than one of them; as "Coleridge was both a poet and a philosopher."

74. I have thus far been speaking of what are called *natural* classifications, based on the *essential* properties of the individuals included in the classes. Thus, if any animal is once a dog or a horse, etc., it is always a dog, a horse, etc. But if we use *accidental* properties, the classes are artificial and fluctuating. Thus, if we speak of men as sick and well, we have the two species denoted by these words. But any individual may belong to one species or class to-day and the other tomorrow.

75. If now, we recur to our four propositions, A, E, I and O, we shall see that :

(1) All *affirmative* propositions either *grow out of* or *make*, in the process of the affirmation, subordinate terms. Horses are quadrupeds, quadrupeds are animals, etc.; this is true because such is the *natural* relation of the objects we are speaking of. But if we say certain men are "sick," "asleep," "laughing," "weeping," etc., we make of them, for the time being, a class. And, in this case, as in the other, the subject and predicate of our proposition are subordinate terms. If the proposition be universal (A), the subject is the lower term; as "all horses are quadrupeds." But if the proposition be partial (I), the subject may be the higher term in the natural classification; as "some quadrupeds are horses."

(1) All *negative* propositions either *grow out of* or *make*, in the process of negation, co-ordinate terms. "Quadrupeds are not birds," and "birds are not quadrupeds." If the classification be founded in the nature of the objects we speak of, then the negation grows out of

the relation, and the objects are permanently co-ordinate. Otherwise, the co-ordination may be merely transient, based on some accidental property.

76. In all *universal* propositions, the *subject* is spoken of as a whole. Hence, it is said in technical terms to be *distributed*. In all negative propositions, the subject is wholly excluded from the class denoted by the predicate. Hence, in this case, the *predicate* is said to be distributed, or:

Universals distribute the subject.

Negatives distribute the predicate.

Or again, and more definitely:

A distributes the subject.

E        "        both subject and predicate.

I        "        neither.

O        "        the predicate.

77. Propositions are either didactic or figurative. A didactic proposition describes a thing by its properties, and the predicate will always be either (1) an adjective, denoting a property of the subject, or (2) a common noun, denoting a class in which it is contained; as "snow is white," "horses are quadrupeds." All others are figurative, or poetic.\*

78. Didactic propositions are either analytic or synthetic. An analytic proposition is a mere definition. It is obtained from a logical analysis of the subject, states only its nature, and adds nothing to our knowledge of it, beyond the mere fact of knowing what it is. Thus, the definition of a triangle, though the beginning of trigo-

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\* This, however, is not exactly the meaning given to the word "figurative" when used in treatises on Rhetoric, and for purposes of rhetorical criticism. But it is founded in the nature of the case, and is a distinction, the importance of which we shall see in the chapters on Language and on Fallacies in Diction below.



nometry, is far from explicitly stating all that is true concerning the triangle. Any proposition that predicates of a subject anything more than its mere definition—that is, its proximate genus and its differentia—is called a synthetic proposition; it adds to our knowledge of the subject.

Definitions are either real or verbal.

79. In a verbal definition we have two words of the same kind or logical quality—the one explaining or giving the meaning of the other; such as we have in dictionaries, etc.; as “common salt is chloride of sodium.” Hence, if one term be abstract, the other must be abstract also, or if one be concrete, the other must be concrete. And again, a verbal definition can always be simply converted. Thus, if “common salt is chloride of sodium,” “chloride of sodium is common salt.”

80. In the case of definitions, both the subject and predicate are distributed; not indeed because they are affirmative propositions; for affirmative propositions, as such, distribute nothing, but because they are definitions and would fall short of being definitions if they did not distribute the predicate as well as the subject, so that nothing could be included in the predicate that was not also included in the subject.

81. In a real definition, there must always be in the predicate (1) a common noun denoting the class or proximate genus, and (2) an adjective. If the thing defined be a species, the adjective will be the differentia of the species; if it be an individual object, the adjective will denote some inseparable accident; as “triangles are three sided plane-figures,” “quadrupeds are four-footed vertebrates,” “Napoleon was the general *who commanded the French at Waterloo*,” and “Cousin was the Frenchman *who founded the eclectic philosophy*.”

82. *Real* definitions also have the important property, already ascribed to verbal definitions; they can be simply converted. If triangles are three-sided plane-figures, "all three-sided, plane-figures are triangles." If "quadrupeds are four-footed vertebrates," then "all four-footed vertebrates are quadrupeds."

83. There has of late years been an effort made to show that in the case of some negatives, the predicate is not distributed. Sir WILLIAM HAMILTON has distinguished himself as the author and advocate of this view. But he has adduced from the range of argumentative literature no examples. He cannot even make one, without violating in form the idioms of our language, and of all languages, and thus, in fact, failing to make his proposed sentence an example.

84. Practically, the answer to Sir WILLIAM'S doctrine is that no such propositions as those that he proposes to recognize, have ever been found among the utterances of men, nor have any syllogisms of the class that he would provide for, ever been made, so far as appears from either his own citation of examples, or the researches of his disciples. Those that have been offered as examples were all manufactured for the occasion, and are manifest fallacies in form, and so of course, ought not to be recognized and provided for.

85. But I think it easy to show *a priori* that all the propositions and syllogisms that he proposes to provide for are impossible. We have recognized the four propositions, A, E, I and O; A and E being universal, distribute the subject; E and O, being negative, distribute the predicate. But Sir WILLIAM thinks we may have affirmatives that *do* distribute the predicate, and negatives that *do not*. Hence he proposes to reckon *eight* propositions instead of four. Thus denoting the four already

discussed in this treatise, as usual, by A, E, I and O, and denoting the other four by the symbols he proposes, we have :

*Affirmative :*

U, toto-total,	-	All (—) is all (—)
A, toto-partial,	-	All (—) is some (—)
Y, parti-total,	-	Some (—) is all (—)
I, parti-partial,	-	Some (—) is some (—)

*Negative :*

E, toto-total,	-	Any (—) is not any (—)
H, toto-partial,	-	Any (—) is not some (—)
O, parti-total,	-	Some (—) is not any (—)
Ω, parti-partial,	-	Some (—) is not some (—)

The blanks included in the parentheses are supposed to be filled with any nouns we please. Thus, in U, “all triangles are all *three-sided figures*,” etc.

86. Now it seems to me that if we correct Sir WILLIAM'S grammar, we shall dispose of his four additional propositions at once.

(1) In the first place, the verb which he uses is in the singular,— “is,” “all is all,” “all is some.” This never occurs in English at all; the adjective pronoun “all,” qualifying only *plural* nouns, and plural nouns of course, require their verb to be plural. We should, therefore, write, “All *are* all,” “All *are* some,” etc. And so with the pronoun “some;” we use it indeed before nouns in the singular number, but then it is followed by either (1) an adjective, as “Some man is sick,” or (2) a noun in the singular number, with the article “a” or “an,” as “some man is a poet,” etc. But if “some” is used before a noun in the plural, the verb is plural also, and that is required in the examples above given. Hence, we should read, “Some *are* all,” “Some *are* some.”

(2) But, in the second place, the pronouns "all" and "some" are not used in English to qualify the predicates at all. This being a negative proposition, it is of course impossible to illustrate it by examples. After compound verbs, it is true, "all" and "some" may be used, as "He told all the men." But if we resolve this into the simple verb and its compounds, we have a different result, "He was telling all the men," etc., where, it is manifest that not the word "men" alone, which is a noun, but "telling the men," which is an adjective, (when all the parts are taken together), is the real predicate. And hence we see that although "all" is used *in* the predicate, and as a part of it, it does not qualify the predicate at all, but is only the limiting modal of it.

87. Make these grammatical corrections, and Sir WILLIAM'S eight propositions are reduced at once to the four propositions we have recognized.

A, All (—) are (—)

E, No (—) are (—)

I, Some (—) are (—)

O, Some (—) are not (—)

And what is thus true and necessary for intelligible expression in English is true also of all other languages that I know anything about. And I think it might be shown to be a necessary result of the very laws and nature of language as a means of expressing thought; resulting from the nature and necessary laws of language, because resulting from the laws of thought itself.

88. But, as a further refutation of his theory, we may remark (3) that from the nature of negation, the predicate must be taken as a whole, or distributed. Negation is negation, exclusion; and that negation which does not exclude one from being another is no negation at all. Affirmation affirms identity in some respects, at least, al-

ways; but negation affirms diversity. *S* is not *P*. In this case, it is manifest (1) that *S* and *P*, as terms, do not and cannot denote the same thing, and hence the things denoted cannot be, or be thought to be, the same. Nor (2) can *S* denote any object or class of objects in the class *P*, for if it did our proposition would be no *S* is not *P*, which is the same in logical effect as *S* is *P*. And the same is true if we take *O*; some *S* is not *P*; for we can make "Some *S*" one word, *Some-S* (*Some S*), and substitute it for *S* in the above demonstration, and the result will be the same, no (*Some S*) is not *P*, or *Some S* is *P*.\*

89. HAMILTON's whole theory with all its errors and mistakes, comes, I believe, from the assumption that Logic deals with "notions," "ideas," "conceptions," or something of the kind, rather than with things. It deals with realities, with things, and uses words to denote and represent things, as we use the letters of the alphabet in Algebra to denote quantities, with this difference only, that whereas in Algebra, we can make *x*, *y*, etc., denote any quantity we please, and a different one if we choose to do so in each equation, in Logic, on the other hand, the same word must always denote the same object or class of objects, and for the obvious reason that words denote things by their properties. But when objects are considered as units, as in Mathematics they always must be, their properties—which make them individuals, distinguish them from one another, and group them into classes, species and genera—are not taken into account at all.

90. There are certain important relations which these four propositions, Universal Affirmative, (*A*), Universal

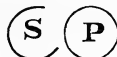
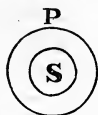
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\*For a continuation of this discussion of Sir William Hamilton's theory of Syllogisms, see below Part II, Chap. II, Sec. I. § 140.

Negative, (E,) Partial Affirmative, (I,) Partial Negative, (O,) sustain to each other, which will be readily understood as soon as we shall have understood the principles of classification and division, already stated.

91. We shall assist ourselves towards the comprehension of the relations of these propositions, as well as towards the understanding of the inferences and changes we are about to discuss, if we represent the propositions to the eye, which we may do by the accompanying wood cut.

A, All S are P, is represented by one circle inclosed in another; E, No S are P, by two circles exclusive of each other; I, Some S are P, by two incomplete circles, cutting each other, and thus having a part common to both; and O, Some S are not P, by one complete circle to denote the predicate and an incomplete one for S the subject to show that the subject in O is not distributed.



It would assist imagination somewhat if these circles were filled with little dots, each one being supposed to represent an individual object as the circles do classes of objects.

92. Immediate inference, by the *opposition* of Propositions.

(1) The propositions A and E are the Universals, and I and O, the *subordinates*, respectively, I to A and O to E.

If now, the Universal is true, its subordinate must be true also. If All S are P, Some S are P. If No S are P, Some S are not P. If, however, the subordinate be true, the Universal is only problematical, that is, it may be true. If Some S are P, all S may be P, that is, there is nothing

in the nature of the assertion to prevent it. There may be insuperable objections, however, in the nature of the subject matter in regard to which the assertion is made, that renders it impossible that it should be so. If we say "some horses are quadrupeds," there is nothing implying that they are not all so. If we say that some triangles are isosceles, there is nothing in the proposition to show that not all triangles are isosceles, though we know from the nature of triangles that they are not so.

(2). The two Universals A and E are called in reference to each other *contraries*. And if one is true the other is false. If All S are P it cannot be true that No S are P. And so, if No S are P it cannot be true that All S are P. But if one of the Universals be false, no inference can be drawn from that fact in regard to the other. Thus, "All men are good" and "No men are good" are both equally untrue; for some are good, and some are bad (not good).

Hence, both universals may be false, but they cannot both be true.

(3). E and I, A and O, are called in relation to each other *Contradictories*. If one of them is true the other is false, and *vice versa*, if one is false the other is true. If No S are P, Some S are P is false. If Some S are P, No S are P is false. If All S are P, Some S are not P is false, etc.

Hence, of two contradictories, both cannot be either true or false.

(4). I and O are called in reference to each other *sub-contraries*. They may both be true, but cannot both be false. If it is true that "some men are good," it is equally true that "some men are not good." Now, suppose both of them to be false. Then the contradictory of one of these, say I, which is E, is true, "No men are

good." But if E is true, its sub-contrary O is true also. And thus O, one of the sub-contraries, is proved to be true by the very supposition that makes both of them to be false.

### 93. *Contraposition of Propositions.*

A term denoting an object by its properties is called a *positive* term. A term denoting an object or a class of objects by the absence of some property is called a *privative* term, as "blind," "deaf," etc. Hence the positive term and its corresponding privative make two co-ordinate species in the same proximate genus. As all animals are either "blind" or "seeing." But we do not speak of a tree, a rock, a mountain, etc., as "blind." We, however, make another class of terms, which we call *negatives*, by prefixing a negative particle to them. As *impossible*, *infinite*, etc. These words do not really denote or describe anything. They are really the complement of the positive term in the summum genus. Thus let S denote any species, and then non-S will include all things, real or imaginary, that are not included in the species S. All things are either possible or impossible. All things are either finite or infinite, etc.

94. By means of these negatives we can change what is called the quality of propositions from affirmative to negative, and *vice versa*, from negative to affirmative.

(1). Thus, if S are not P, S denotes a species that are not included in the class P; and if not included in P, they are in non-P. That is, S are not P.

Hence, by substituting the negative of the predicate itself and dropping the negative from the copula, or, in other words, by connecting the negative with the predicate instead of with the copula, we have an affirmative proposition with a negative term for its predicate, instead of an affirmative proposition with a negative copula. [It



should be noticed that no S are P is the same as "All S are not P.]"

(2). If we have the Universal Affirmative All S are P, we can by means of *two* negatives make it a negative proposition. This is most likely to be done by using the negative copula "no" or "not" with a negative predicate. As No S is non-P. Or we may say there is no S that are not P. "There are no horses that are not quadrupeds."

This is called stating a proposition by *contra position*, and the two forms may be called the first *exposita*, and the second *contra-posita*.

(3). I can never be stated by contra-position, for it has no term that is distributed. But O is frequently stated so, for the purposes of logical analysis and resolution. Thus, Some S are not P is the same as some S are non-P.

(4). And for E, the Universal Negative, we may have a negative term for a subject if we will use it as an undistributed term. Thus, if "no men are horses," "Some non-men," that is some things that are not men, are horses." This will hold true if we remember that the summum genus includes all things conceivable or inconceivable, all things that can be thought of or spoken of, whether real or unreal, possible or impossible.

95. By *Conversion* of Propositions.

In the conversion of propositions we change the relative position of subject and predicate. Thus, S are P becomes P are S.

The first form of a Proposition is called the *Exposita*, and the second is called the *Converse*.

(1). It is manifest that E and I can be converted simply, as it is called. If No S are P, No P are S. The two are co-ordinate species, totally exclusive of each other. Or, if some S are P, "Some P are S." The two are al-

ternate species, and are mutually inclusive *in part* of each other. "Some poets are Americans." "Some Americans are poets."

(2). But in the case of A, the Universal Affirmative, this mode of conversion cannot be practiced. For in A the subject is but a species in the class denoted by the predicate,—the predicate, as we have so often said, being the more comprehensive class. If "*All* poets are artists" it does not follow that "*All* artists are poets." Hence, A may be converted into I by limitation or *per accidens*, as the Schoolmen say, "*Some* artists are poets."

In case, however, the subject and predicate of a Universal Affirmative are synonymous, that is two words denoting the same thing, the proposition may be converted, simply. As "lunar caustic is nitrate of silver," therefore, "nitrate of silver is lunar caustic." Such propositions are called *identical*.

96. By both *contraposition* and *conversion* combined.

(1). We have seen that O, the partial negative may be contraposed into I, by substituting for its predicate, terms of the opposite quality, (that is a negative for a positive, and *vice versa*), and dropping the negation from the copula, as Some S are not P, Some S are non-P. In this form it may be converted thus, Some non-P are S, "Some men are not poets," "Some things that are not poets are men." O can be converted in no other way.

(2). By the same two-fold change, A may be made into an exclusive proposition, as "All civilized persons are white." By contraposition as before explained, we may have "No civilized persons are not white." But we may convert this into the exclusive form, "None but whites are civilized." That is, if all the species civilized are included in the genus white, none that are not included in the genus white, can be in the species civilized.

97. There are one or two forms of double propositions that it may be well to notice in this place.

(1). One we may call the *exceptive*, thus, "All S except X are P." Here we have the proposition A, All non-X are P, and the negative, No X are P, "All but the Apostles fled." "All non-Apostles fled," and "No Apostles fled," are both contained in the exceptive proposition.

(2). We may also have another form of the exclusive propositions, thus if "None but whites are civilized," we can say "whites are the only civilized persons," "Virtue is the only thing worth living for." Here we have the double proposition, "Virtue *is* worth living for," "All other things are not worth living for."

98. As covering the whole ground, we have the two following canons:

RULE I. *Two negatives in whatever form are equivalent to an affirmative.*

RULE II. *No term may be distributed in the converse that was not distributed in the exposita.*

99. These transformations of propositions are of use not only in the analysis and criticism of arguments,\* but

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\* Let the student resolve each of these sentences into their three parts, Subject, Predicate and Copula ; state the Quality and Quantity of each Proposition ; convert them ; state them by contraposition ; show what inference can be drawn from them by the opposition of propositions, and resolve those of them that are compound into their simple and elementary propositions.

1. Birds fly.
2. There is a fish in the tub.
3. Great is the work of life.
4. That man's heart is not in the right place.
5. It is wrong to put an innocent man to death.
6. A soft answer turns away wrath.
7. There is no possibility of proving his assertion.
8. Few treatises contain truth unmixed with error.
9. The French are among the best soldiers in the world.

also and to a far greater extent, for giving emphasis to truths which might otherwise appear comparatively tame. Thus the proposition "all men are sinners," is trite, but it becomes more emphatic when it is put in the form of a double negative, "there is no man that is not a sinner." And in fact, it is one of the most constant and most important of the rhetorician's efforts to so arrange the words in his sentences that they may arrest attention, and fix themselves in the memory of the reader or hearer. Hence a knowledge, nay more, a thorough comprehension of the Logic of propositions is essential to the thorough mastery of the best skill in the art of using them. And on the other hand, a knowledge of the Logic of Propositions is quite as indispensable as a means of preventing our being misled by the mere rhetoric of propositions that sound large and mean but little or nothing.

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10. Not all that glitters is gold.
  11. All that glitters is not gold.
  12. Nothing is heavier than platinum.
  13. Feathers are heavier than nothing.
  14. There is no place like home.
  15. None but the brave succeed in life
  16. None are civilized but the Caucasians.
  17. All but the bad will be saved.
  18. Virtue and vice are alike in some respects.
  19. Integrity is the only thing that can save a man.
  20. A true man is a public benefactor, though he be not appreciated.
  21. Neither wealth nor knowledge can wholly satisfy man's wants.
  22. When the Israelites came out of Egypt, Moses was their leader.
  23. In studying the history of a nation we must take note of the physical features of the country they live in.

## CHAPTER II.

### THE LOGIC OF FORMULÆ.

100. A Syllogism is any combination of two propositions called Premises out of which, or from which, can be derived a third proposition called a Conclusion.

101. Out of the first named relation, (§ 37, 1)—that of quality—arise *categorical* propositions, as they are called. They simply affirm an object or class of objects to be, or not to be, in a certain class; as “Horses are quadrupeds,” “Birds are not quadrupeds; or to have, or not to have certain properties; as “Snow is cold,” “Ice is not warm,” etc., etc. Any syllogism that has both premises categorical is called a categorical syllogism.

102. Out of the second relation, (§ 37, 2)—quantity—arise comparative propositions, as already stated; and any syllogism that has one or both of its premises comparative is a comparative syllogism.

103. The propositions that arise from the relation of causality, (§ 37, 3), are called, for the purposes of discussion in Logic, conditional propositions. They consist of two simple categorical propositions, one of which is affirmed to be true on condition that the other is true. Thus, if A is B, C is D, in which the former is considered as a *cause*, in some sense, and the latter an effect. Any syllogism that has one premise conditional is called a conditional syllogism.

104. The propositions that arise from *totality* (§ 37, 4) or the relation of parts to wholes, are called disjunctive propositions; and they also consist of two categorical propositions, one of which is asserted to be true on condition that the other is not true; as Either A is B, or C is D. And any syllogism that has one premise disjunctive is called a disjunctive syllogism.

105. But as the three last named kinds of propositions presuppose, and in a measure depend upon categorical propositions and the relation of classification, we will consider that class first.

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## SECTION I.

### CATEGORICAL SYLLOGISMS.

106. If any one has mastered the principles of classification discussed in the last chapter, the following propositions will be self-evident :

(1) Whatever may be affirmed or denied of any class may be affirmed or denied accordingly of whatever is contained in the class. The terms are subordinate.

107. The rule just stated above, is what is commonly known as ARISTOTLE'S dictum *de omni et nullo*.

We have from this canon the following as corollaries :

(a) The predicate of a predicate is predicate of its subject, also, and

(b) The subject of a subject is subject of its predicate also.

Thus, A is B, B is C, therefore, A is C; that is, C is predicate of B, and therefore, predicate of A, which is

B's subject. And A is subject to B, and therefore, subject to C which is B's subject.

And thus, the terms in any ascending series [§ 60], are so related that each one may be subject in a proposition to any one above it, and predicate to any one that is below it.\*

[2] Wherever a term may be affirmed of one object or class of objects and denied of an other, the two may be denied of each other reciprocally. The terms are co-ordinate.

That is, if terms or species are not included in any one class or genus, they cannot be included one in another. If A and B are not species which are included in C, they cannot be either subordinate or alternate to each other. Hence, they must be co-ordinate, and may be denied of each other.†

[3] Wherever two terms may be predicated of one and

\* Under this rule there are but four syllogisms, called respectively (for reasons which I will explain below), (§118), *Barbara*, *Celarent*, *Darii* and *Ferio*, for example, we have

*Barbara*, All injustice is wrong ; persecution is injustice ; therefore, persecution is wrong.

*Celarent*, No valuable acquisitions are within the reach of the idle ; science and literature are valuable acquisitions ; therefore, they are not within the reach of the idle.

*Darii*, All minerals are dug out of the earth ; some of the most useful things are mineral ; therefore, some of the most useful things are dug out of the earth.

*Ferio*, No upright man should be treated with contempt ; some ignorant men are upright ; therefore some ignorant men should not be treated with contempt.

† Under this rule there are four syllogisms, namely :

*Cesare*, Birds are not viviparous ; bats are viviparous ; therefore, bats are not birds.

the same object, they may be predicated of each other partially. The terms are alternate.

But in case one is affirmed and the other denied of the common term, that term which is denied of it in the premises may be denied partially of the other in the conclusion. Thus, "If whales live in the sea, and yet whales are not fishes," it is manifest that some things that live in the sea are not fish.

Or, this third rule may be stated in two forms, as follows:

[a] Any two predicates that are affirmed of the same subject may be predicated partially of each other.

[b] If of two predicates one is affirmed and the other denied of the same subject, that one which is denied of it may be denied of the other partially; as M are S, M are not P, then some S are not P.\*

*Camestres*, Mere natural inclinations are common to man and brutes; the virtues are not common to man and brutes; therefore, the virtues are not mere natural inclinations.

*Festino*, Nothing really expedient is dishonest; but some things that appear to be expedient are dishonest; therefore, some things that appear to be expedient are not so.

*Baroko*, The contented are happy; some Christians are not happy; therefore, some Christians are not contented.

\* Under the third rule there are six syllogisms, as follows:

*Darapti*, Governments are necessary to the welfare of man; but governments are always a restraint upon the governed; therefore, some restraints are necessary to the welfare of man.

*Disamis*, Some acts of friendship are unjust; all acts of friendship please those that are benefited by them; therefore, some things that please those that are benefited by them are, nevertheless, unjust.

*Datisi*, Every form of pride is sinful; some forms of pride are commended by mankind; therefore, some things commended by mankind are sinful.



[4] Any term of which another has been predicated may be predicated partially of that term and of any term of which it may be predicated.

In this case the terms are subordinate, as under the first rule, but here they are taken in the reverse order, "animal," "quadruped," "horse," and we have "Some animals are horses."

If we would regard negative propositions as affirmatives with negative predicates [§ 56, ], we should need no further rules. But to provide for considering and treating them as negatives, we have

[a] If any term be denied of that which has been predicated of another, that other term may be denied of it. Thus, "All horses are quadrupeds; no quadrupeds have wings; therefore, nothing that has wings is a horse."

[b] Again, if a term has been predicated of another, any term of which that other has been denied may be partially denied of it. Thus, "No fish have lungs; but some animals that have lungs live in the water; therefore, some animals that live in the water are not fish."\*

*Felapton*, Empty pretensions are inconsistent with true integrity; yet they are often successful in life; therefore, some things that are successful are inconsistent with true integrity.

*Bokardo*, Some lawful money has no intrinsic value; yet all lawful money passes current in the market; therefore, some things that pass current have no intrinsic value.

*Ferison*, No virtues can be acquired without effort; but some virtues are necessary to respectability; hence, some things necessary to respectability cannot be acquired without effort.

\* The five syllogisms under this rule are as follows:

*Bramantip*, Worldly honors are transient vanities; and transient vanities are always sources of disappointment; therefore, some of our sources of disappointment are worldly honors.

108. For the convenience of discussion, it is customary to speak of the subject of the conclusion as the minor term and the premise that contains it as the Minor Premise, and the predicate of the conclusion as the major term and the premise that contains it as the Major Premise; thus, S are M, M are P, therefore S are P. S being the minor term, P the major, and M the middle, and the minor premise, in this case, stated first, though it is most common to state it last.

109. It will be obvious on a moment's reflection that if we combine the four propositions, A, E, I and O, in triplets, we can have, in all, sixty-four combinations, called Moods. Thus, let the major premise be A, and for the minor premise we may have either A, E, I or O, and in like manner, with each of these for minor premise, we can have either of them for conclusion. And each of these sixty-four moods may be stated in either of the four different ways, called Figures, thus giving in all two hundred and fifty-six syllogisms. Of these, however, only ten moods and nineteen syllogisms are found to be valid and valuable.

Thus, if we have the mood A, A, A, in which all the propositions are universal affirmative, we may have E,

*Camenes*, All virtues ennoble their possessors; but nothing that ennobles its possessor is to be lightly esteemed; therefore, nothing that may be lightly esteemed is a virtue.

*Dinamis*, Some good men meet with great misfortunes; but all that meet with great misfortunes are under discipline; therefore, some of those that are under discipline are good men, nevertheless.

*Fesapo*, Nothing that is vicious should be permitted as an amusement; but everything permitted as an amusement is a recreation; therefore, some recreations are not vicious.

*Fresison*, Reason is not instinct; instinct is a natural capacity; therefore, there are some forms of natural capacity besides reason, [or that are not reason].

E, E also, in which they are all universal negative; or E, A, E, in which the major premise is universal negative, the minor, universal affirmative and the conclusion is universal negative. And this combination we may vary so as to produce sixty-four moods.

110. But with any one of these varieties of moods, we may have four sub-varieties, called Figures, according to the position of the middle term. Thus, calling the minor term S, the major P, and the middle term M, we have

[1]	[2]
M are P,	P are M,
S are M,	S are M,
∴ S are P.	∴ S are P.
[3]	[4]
M are P,	P are M,
M are S,	M are S,
∴ S are P.	∴ S are P.

That is, in the

1st, The middle term is subject of the major and predicate of the minor premise,

2d, It is predicate of both premises,

3d, It is subject of both premises,

4th, It is predicate of the major and subject of the minor premise.

We have thus exhausted the possibilities of form and structure of categorical syllogisms. With but the three terms there can be but the sixty-four moods and but the four ways or figures of stating the moods.

111. So too, there can be but the four relations of terms, subordinate, co-ordinate, alternatè and disparate, [60-68]. The first of the four rules provides for subordinate terms taken directly, and the fourth provides for them if taken indirectly, or in the inverse order; as

will be seen if we refer to the first and fourth figures, (§ 110). The second rule provides for co-ordinate terms and the third, for alternate. Disparate terms, having no constant relation to each other, and no relation, *as disparate*, from which any inference can be drawn, there can of course be no principle or rule of inference from them. They *may be* alternate or co-ordinate; they *may be made* subordinate and then, of course, inferences can be drawn from them as subordinate, as alternate or co-ordinate.

112. The Fallacies as they are called, that is the faults whereby these possible forms fail to fulfill the conditions of any one of the four rules, are also reduced to four classes, as follows:

(1) If *both* premises are negative there will be no conclusion.

(2) If *one* premise be negative, no affirmative conclusion.

(3) If the middle term be not once distributed, there will be no conclusion.

(4) If any term be distributed in the conclusion which was not distributed in the premises, the conclusion will not be valid.

It will be remembered that a term is said to be distributed when it is the subject of a universal, or predicate of a negative proposition.

113. It will often be found in analyzing a syllogism that there are really four terms when there had appeared at first to be but two. Thus, in Hume's famous sophism, "My hand touches the pen; the pen touches the paper; therefore, my hand touches the paper," we have really four terms: (1) my hand, (2) touches the pen, (3) the pen, (4) touches the paper.

This is called the Fallacy of many terms.

114. A proposition can be reduced to the three parts "S," "is" and "P," etc. Thus, "John *eats*," "John is *eating*." And it will sometimes happen that when this analysis of both premises gives us four terms, as in the case just cited, there will yet be a possibility of supplying a third premise, thus making a Sorites, as it is called, that will be valid, (§ 152, 160). And in some cases, also, the premise to be supplied will need to be a comparative proposition, (§ 317). Thus, "John eats meat; meat is expensive; therefore John eats what is expensive." Here we have four terms, (1) "John," (2) "meat eating," (3) "meat," (4) "expensive." But if we have "Whatever is true of meat is true of meat-eating, in this respect," we have a complete Sorites. Or, we can put all the words into three terms, (1) "John eats," (2) "meat," (3) "expensive." Wherever this can be done—for a reason that will appear below—the syllogism is valid, though it may appear to be a fallacy of many terms. This, it will be seen, cannot be done with Hume's sophism. We have at least, (1) "my hand touches," (2) "pen," (3) "pen touches," (4) "paper," and no ingenuity that I know of can reduce the words to less than the four terms. And the third premise that would be required to make the Sorites, is "What touches the pen is the pen," which is of course absurd, or "Whatever may be said of that which touches the pen may be said of the pen, in this respect," which is also absurd.

115. A violation of the first or second rules gives what is called the fallacy of Negative Premises.

It will often happen, however, that the two negatives may be made modals of the middle term, and then we have a valid conclusion. Thus, S are not M, not M are P, therefore, S are P. We might write the modal term as a negative term, non-M, and make it and the negative particle one word.

116. A violation of the third rule constitutes what is called Undistributed Middle, thus

Dogs are animals;

Horses are animals;

From this we could not infer that dogs are, or are not horses.

117. A violation of the fourth rule constitutes what is called Illicit Process and may occur with either the major or minor term.

(1) Thus, for an Illicit process of the Minor we have

All horses are quadrupeds;

All horses are useful animals;

*Therefore*, all useful animals are quadrupeds; whereas, the premises prove only that "some," not *all* useful animals, etc.

(2.) For an Illicit of the Major we have,

The Negroes have black skins;

The Arabians are not Negroes;

*Therefore*, the Arabians have not black skins.

118. Applying these rules and tests, we find that there are only nineteen syllogisms that are valid and useful, four in the first figure, four in the second, six in the third, and five in the fourth.

The Scholastic writers have put the names of these nineteen syllogisms, into Hexameters, as follows:

BARbArA, CEIArEnt, DArII, FErIO*que, prioris.*

CEsArE, CAmEstrEs, FEstInO, BArOkO, *secundæ.*

*Tertia*, DArAptI, DIsAmIs, DAtISI, FEIAptOn.

BOKArDO, FErIsOn, *habet; Quarta insuper addit.*

BrAmAntIp, CAmEnEs, DImArIs, FEsApO. FrEsIsOn.

The vowels used in forming the names of the syllogisms were selected to indicate the Propositions, A, E, I, O. All beginning with B can be reduced to the form

of Barbara; all with C to Celarent; all with D to Darii; all with F to Ferio. The Consonants indicate the changes that are necessary to reduce them to the First Figure.\*

\* "m" indicates transposition of the Premises, so that the Major becomes Minor, and *vice versa*.

"s" denotes that we are to convert *simply* the proposition before it as in Cesare for No S is P, read No P is S.

"p" denotes that we are to convert *per accidens* or by limitation, the proposition before it, as in Darapti, for All M is S, we are to have Some S is M.

"k" denotes (in the old method,) that for the proposition before k, we are to substitute the contradictory of the conclusion. This will give for a new conclusion the contradictory of the old, which from being false or absurd, will imply by immediate inference the truth of the old conclusion.

But by means of the contra-positions and conversions described above, (§ 93-95,) we can accomplish the same result more directly as will be seen below. Thus,

Cesare	to	Celarent.
No P are M,	s converts simply,	No M are P.
All S are M		All S are M.
∴ No S are P.		∴ No S are P.

Disamis.

Some M are P,	} convert and transpose,	{ All M are S.
All M are S.		{ Some P are M.
∴ Some S are P.		∴ Some P are S.

and by conversion, Some S are P.

Felapton.

No M are P,	} convert "p"	No M are P.
All M are S,		Some S are M.
∴ Some S are not P,		∴ Some S are not P.

Baroko becomes Ferio, instead of Barbara. Thus for the Major Premise of Baroko, we have, All P are M, then No non-P are M, and No M are [non-P]. With this for Major, we have,

No M are non-P.

Some S are no M,

∴ Some S are [non-P,] or Some S are not P.

which is Ferio of the first figure.

With Bokardo of the third figure we can effect a like transforma-

119. I have also discussed the Formulæ thus far as if all the terms were simple and consisting of only one word. But this is seldom the case; in fact, it never is the case with what are called material syllogisms. And it will often happen that a modal that is used with a term in one part of a syllogism will, for the sake of variety of expression, and to avoid stiffness and awkwardness of expression, be varied, or dropped entirely, when the term occurs in the other part. And on the other hand, there is often a disposition, for the purely rhetorical purpose of emphasis, to insert a modal in the conclusion that did not appear in the Premises. For this reason it becomes necessary to consider the function of Modals a little further.

120. A Modal, unless it be a mere expletive, adding nothing to the meaning of the proposition, is of the nature of an adjective, if it be not a mere adjective, as "men," "white men;" "men" "men who keep their promises." And it is a mere question of idiom and rhet-

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tion. It then becomes Darii. For the Major Premise Some M are not P, write the Minor Premise as Major, and then include the negative in the Predicate of the Minor, and we have,

All M are S,

Some M are [non-P,]

then we have,

Some [non-P] are M.

and by conversion, Some S are [non-P,] Some S are not P.

These conversions are rather curious, more amusing than useful. A familiarity with them will, however, well repay the labor it will cost to any one who aims to make himself thoroughly master of the science and formulæ of reasoning. And I know of nothing that will be of more service in giving one that familiarity with the formulæ and that insight into their force, and that quickness in detecting fallacies in form, than an exercise in converting not merely the abstract forms, made in the use of the letters S, M and P, but also the fuller examples of syllogisms given above, pp. 61-65 Notes.



oric whether the modal can be expressed or is expressed in one way or the other.

121. The dictum of Aristotle stated above (§§ 106, 1, 107,) is, in fact, about the most general of all the principles of deduction. It results from it:

(1). That we may replace the subject of a universal or the predicate of the negative proposition by any term that is lower in the subordinate series, as "All men are mortal," "white men are mortal," "Englishmen are mortal," "Birds are not quadrupeds," "birds are not horses," etc.

(2). We may replace the subject of a partial proposition or the predicate of an affirmative proposition with a higher or more comprehensive term, as "Horses are quadrupeds," "horses are animals," "Some Americans are poets," "some men are poets."

122. But as the subject of universals and the predicate of negative propositions are always distributed and the subjects of partial and the predicates of affirmative propositions are undistributed, the two rules just stated are equivalent to:

We may replace a distributed term by a lower and less comprehensive one, and an undistributed by a higher and more comprehensive term.

123. We might prove this rule in another way, as follows: Any noun that occurs in a proposition may be made the subject of the proposition and all the other words will then become predicate. Consequently for a distributed term occurring anywhere, even as part of a modal, we may substitute a lower one and for a partial term a higher one, as "He had a majority of the votes in all the wards." "All the wards" is a distributed term and but part of a modal, and yet we may substitute for "all the wards," "the first ward," and the proposition will still be true, if it was so before.

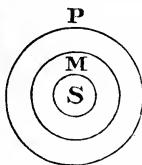
Of course it will make no difference whether we insert for a lower term another word or limit the one used, by an adjective, as for "man" either "negro" or "black man." And in the other direction the omission of an adjective or modal enlarges the sphere of the noun, as for "Englishmen," "men," for "white horses," "horses."

124. Now it so happens that in fifteen, at least, out of the nineteen syllogisms there occurs a Universal Affirmative; and this of course makes the subject the lower and subordinate term to its predicate. Taking then the other proposition for a Major proposition [as we may call it in this connection,] and we may replace either of its terms by one or the other of those in the Universal Affirmative according to the rules just laid down and we have at once a vindication of the validity of the syllogism.

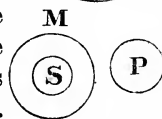
125. And even with regard to the remaining four, Ferio, Festino, Ferison and Fresison, it would be easy with a little ingenuity to state the major premise E, by contraposition, as a Universal Affirmative, and thus bring them under the same rule.

I have given in the last Chapter diagrams representing the four Propositions, A, E, I and O.

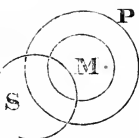
126. Now we can always add to these a third circle so as to indicate a syllogism and the nature of its conclusion, if it has any that is valid. Thus, take AAA in the first figure and we have All S are M, All M are P, and we may write it with three circles in this form when it is manifest that S is in P, or All S are P.



For the Figure EAE we shall have one circle S in the circle M and another circle P, exclusive of the other from which it is manifest, that S is not in P or No S are P.

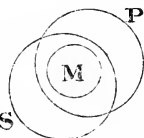


For AII we shall have two circles M in P, and since some S are M we shall have S an incomplete circle cutting M, and of course, therefore partly included in P or S some S are P.

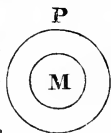


127. In the first two examples it is manifest that there is but one way of constructing the syllogism; but in the last we might have left the ends of the incomplete circle S wholly within P, in which case the conclusion indicated would be All S are P. Hence in this case there are two ways of completing the construction, the one giving a universal and the other only a partial conclusion in the same quality.

128. The diagram that illustrates the third Figure affords another example of the two fold construction P are M and S are M. The circle P must include M as must also the circle S. Hence, S and P must have so much as M, at least, in common, and Some S are P and conversely Some P are S. But the whole of S might be in P or the whole of P might be in S. Hence, two ways of construction, and the partial is proved to be true while the universal conclusion is shown to be probable only.



129. But besides this there will sometimes be three different ways of completing. Suppose we try AEE in the first Figure; All M are P, No S are M, therefore No S are P. We have for Major Premise, All M are P: but for the Minor, No S are M, we must put S out of M, indeed, but this may be done with S, (1) in P between M and P, (2) with S out of P entirely, or (3) partly out of and partly in P. In the former case the conclusion indicated would be All S are P, in the second, No S are P,



and in the third, Some S are P and Some S are not P. Hence it is manifest that AEE in the first Figure proves nothing; it is invalid, it is Illicit of the Major.

In this way it is easy to show that if both Premises are negative there can be no Conclusion. Either Premise will give two circles exclusive of each other, S and P, (§ 91,) the other will make a third term T. If now T is not P, we have a third circle exclusive of P indeed, but it may be (1) in S, (2) out of S, or (3) partly in and partly out of S.

130. Hence we have the following Rules:

(1). If there is but one way of constructing the Syllogism, the Syllogism is valid and the construction indicates the conclusion.

(2). If there are two ways of constructing the Syllogism, the inferior or partial conclusion indicated is valid, I rather than A, O rather than E.

(3). If there are three ways of constructing the Syllogism, there is no valid conclusion.

131. It is also worth considering that

(1.) If we have both Premises affirmative and the Middle Term alone distributed we may have a conclusion in I.

(2.) If both Premises are affirmative and the Middle Term and one extreme be distributed we may have a conclusion in A, the distributed extreme being subject.

(3.) If we have one Premise Negative and the Middle Term and one extreme distributed we have a conclusion in O, the distributed extreme being predicate.

(4.) If we have one Premise Negative and all three terms distributed we may have a conclusion in E, either extreme being subject.

But, of course, if both Premises are Negative, there will be no conclusion.

132. The validity of either of the Nineteen syllogisms may also be deduced from Aristotle's dictum, stated as Rule 1 [§ 106,] by what is called the conversion of syllogisms; that is such conversions and contra-positions of the Premises as may be made in accordance with the rules given in the Note on page 69.

133. We have considered syllogisms thus far as made up of universal and partial propositions. But, in fact, many propositions that are universal in form, are only general, having exceptions. And, of course, therefore the subject of the partial proposition may include only those that are exceptions; thus, "all men are rational beings; some men are insane; therefore, some insane men are rational;" or, "some rational beings are insane." In a sense this might be true, insanity being but a privative term, implying that those who are actually insane are in an abnormal condition; that they are essentially rational, only accidentally insane.

134. Again, if the Minor term be an individual term, it is quite possible that it is one of the exceptions to the general rule, of which the Major Premise is a statement. Thus, "all human beings are born of human parents. But Adam was a human being, therefore Adam was born of human parents." The proposition, "all human beings," etc., can, of course, be only general, since in any event and on any theory, the first human being was not born of human parents.

Hence, if the Premise which is universal in form be only general in fact, the conclusion can be considered as made probable only by the syllogism.

135. Writers usually make a distinction between *formal* and *material* syllogisms. A material syllogism differs from a formal one only in that while it contains all that is necessary to a syllogism it is not stated in syllogistic

form. But, of course, it can be reduced to such a form. In the reduction of material syllogisms to the syllogistic form great ingenuity is often requisite, and there is no little risk of error. It is believed, however, that a thorough mastery and a diligent application of the rules and principles already discussed will be amply sufficient for all cases.

136. It must be carefully noted that we have discussed the formulæ thus far only in reference to what appears in the form of the propositions and is implied in their very nature. If, however, by any peculiarity of the structure of a sentence, it appears that a term is distributed where by the nature of the simple proposition, as either partial or affirmative, we should not expect it, this fact will often give validity when otherwise we should have either Illicit process or undistributed Middle.

137. It will sometimes happen that the Middle term of a categorical syllogism will consist of two nouns connected by a conjunction. This conjunction will require to be changed from copulative to disjunctive, or the reverse, in case the Premises are of different quality, one being affirmative and the other negative, thus:

M and N are P.

But S are neither M nor N.

*therefore* S are not P.

Or, again:

P are neither M nor N.

But S are either M or N.

*therefore*, S are not P.

Were it not for this change in the quality of the conjunction, we should have—as a little thought will show—an Undistributed Middle.

138. When, however, either the Minor or Major term is a double term, no such change of the conjunction connecting them is required.

139. Any categorical syllogism that is at all valid may be put into one or another of the fore mentioned Nineteen. If not already so stated, it is merely a material syllogism not stated in technical form.

140. The assertion, however, that there are but the nineteen valid Formulæ, and that all valid categorical syllogisms can be reduced to one or another of these forms, is based on the fact that there are but the four varieties of categorical propositions already discussed, A, E, I and O. I have, (§ 83-89) referred to Sir William Hamilton's theory of "*quantification*," as he calls it, for the purpose of showing that there can be no such propositions as he proposes to recognize as constituting the additional four. It may be well, however, now to recur to the subject again for the purpose of showing that the syllogisms that he proposes to recognize are either invalid, Fallacies in Form, or are only material syllogisms that can be reduced to one of the Nineteen forms.

141. His theory may possibly be more simple and satisfactory as an explanation; but I think not. On the contrary, it seems to me much more complicated and less satisfactory than the one I have given above. It is, in fact, so long and so complicated that I have not thought it worth the while to discuss it here.

142. Sir WILLIAM proposes to recognize what he calls the *Intensive* Syllogism as distinct from what he calls the *Extensive*, to which class he refers those we have been considering. He is much mistaken, however, as I think, in regarding it as a Categorical Syllogism at all. His example is:

The notion A comprehends the notion B.

The notion B comprehends the notion C.

∴ The notion A comprehends the notion C.\*

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\* Lects. on Logic, p. 192.

As such it contains four terms, and can in no way be made a Sorites without involving a manifest absurdity.

But here is a manifest mistake in the terms. The terms are not A and B and C, simply, but (1) "*the notion A*" (2) "*comprehends the notion B,*" (3) "*the notion B,*" and (4) "*comprehends the notion C,*" and in order to complete this as a categorical at all, it must be a Sorites with three premises, the supplied premise being the manifest absurdity "*that which comprehends the notion B is the notion B.*"

But his example, if we take it in reference to its meaning, is only the material syllogism, which may be stated in form, thus :

All B is A

All C is B,

*Therefore*, All C is A.

The proposition "*the notion A comprehends the notion B,*" being in his use of terms just equivalent to the proposition "*All B is A.*"

143. But Sir WILLIAM'S example, and in fact, all the examples of what he calls Intensive Syllogisms, involve a fallacy of another kind. His example, which I have abridged by the substitution of letters for his terms at length, is "*the notion man, comprehends in it the notion of responsible agent,*" etc. What he says is, "*in common language.*"

"Man is a responsible agent,

But a responsible agent is a free agent,

*Therefore*, Man is a free agent."

Surely we need nothing more to assure us that what he has called Intensive Syllogisms, are not Syllogisms in form at all, but a certain artificial, unnatural, or at least *un*"common" way of stating common Syllogisms.

144. But to our criticism. The real subject of the



premises cited at length above, "the notion man," etc., is not "man," but "the notion man." How are we to understand this grammatically? Are "notion" and "man," which are certainly two nouns, in apposition? or are they to be understood as connected by the preposition "of," and thus equivalent to the "notion *of* man?" The difference is material. And it seems that the latter view alone is tenable, since two terms can never be in apposition except when they denote the same thing, and to denote the same thing, they must be of the same quality. "Man," we have seen, is a general term. But what is "notion?" If it means something *in the mind* representing external objects, as some metaphysicians hold, and as Sir WILLIAM'S philosophy seems to imply, then the word is concrete indeed, but individual also, and cannot *comprehend* a class in any sense, however it may denote or represent one. If, however, the word is abstract and denotes only as DESCARTES and COUSIN, with others, have taught, then it can in no way be in apposition with man.

145. But further than this, the sentence itself implies a division, which in this case, is impossible, and thus asserts what is not true. And as the Minor Premise and the Conclusion are like the Major Premise in this respect, they are also like it, untrue in fact. He states his conclusion with the remark, "Therefore on the principle *that the part of a part is a part of the whole,*" "The notion man comprehends," etc.

146. Now whatever is a whole containing parts may be resolved into those parts, in one of the six ways already described. *Analysis*, Physical and Logical. *Division*, mathematical, logical and physical, and that to which I have given no name by which a collective whole, as a family, etc., is resolved into its parts. But by no

one of them can the "notion man" be resolved, divided or analyzed into "the notion, responsible agent." Not logical analysis, for that gives only abstract terms, but "agent" is not abstract. Not physical analysis, for that analyzes only material things, "notion" is not material. We say water comprehends oxygen, etc., only when the oxygen can be obtained from it by physical analysis. There can be no pretense of mathematical division. Logical division divides the class genus into species, and species into individuals, and that which is subject of logical division must be denoted by a noun in the plural, as we divide "men" into Caucasians, Mongols, etc. Physical division, like physical analysis, divides only physical or material objects. There can be no pretense that "notion" is a collective whole, and hence none of the other division which resolves that kind of wholes into three parts.

147. Or if one should say that "notion" is something in the mind that represents external objects, as is so often implied in most of our metaphysical writers, we should indeed make of it something that would be subject to physical analysis or physical division, one or both of them; but neither of them could give the result here required. The "notion," "idea," "concept," etc., are all of the same kind and quality, and when regarded as concrete realities at all, they are supposed to be made up of elements, each one of which either *is* or *represents* a property of the object itself.

148. Hence, as said above, the only analysis to which it could be subjected would be that which would resolve it into parts which are properties and must be denoted by abstract terms. And in this view we cannot say that the "notion man, comprehends the notion agent," but only the notion of man comprehends the notion of free-

dom, or better still, "comprehends freedom." And even if "notion" be a concrete term, a physical division or analysis of it is too absurd to be thought of. Hence, there is no sense of the word, as I apprehend, in which it can be said literally, "the notion man, comprehends the notion free agent." We may indeed say "the class man, includes free agents," or that "free agency is essential to the class." But in no proper sense can we speak of notions or ideas as "including" or "*doing*" anything; they are nothing themselves.

149. I consider therefore, Sir WILLIAM HAMILTON'S theory of Syllogisms to be unfounded in fact and absurd in theory. It is not, however, a mere question of theory. As I have undertaken to show, no syllogisms were produced that call for or justify the extension he would give to the list named, which cannot, if they are categorical at all, be regarded as mere material syllogisms, needing only some modifications of their statement to reduce them to the form of some one of the Nineteen, whose names and forms have been already given.

150. It will seldom happen in practice, that an argument is stated simply as a syllogism with *two* Premises and a Conclusion. We have either,

(1.) A series of more than two Premises followed by a Conclusion to which they are all necessary, how many soever they may be, or,

(2.) One Premise only, followed by a conclusion, as if the Premise stated were the only one that is used.

In the former case we have a complex argument called a *Sorites*, and in the latter an incomplete syllogism called an *Enthymeme*.

151. The *Sorites* can be reduced to two or more of the Nineteen Formulæ, and the *Enthymeme* can always be

completed into one of them, unless it involves some fallacy in form.

152. A Sorites consists really of several syllogisms consolidated or abridged into an argument, thus:

All A are B,

All B are C,

All C are D,

*Therefore*, All A are D.

This may be reduced to two simple syllogisms, thus:

All B are C,

All C are D,

All A are B,

All A are C,

*Therefore*, All A are C.      *Therefore*, All A are D.

153. In this case we make the second Proposition, the Major Premise of the first syllogism, the first Proposition the Minor Premise. The third Proposition is the Major Premise of the second syllogism, and the Conclusion to the first syllogism is the Minor Premise of the second syllogism, and so on until we arrive at a Conclusion which is the same as that of the Sorites.

154. The principles already laid down, with a slight modification, apply to Sorites, as well as to Syllogisms.

(1). There may be no more terms than the whole number of Propositions including the Conclusion.

(2). After *two* negative premises there can be no Conclusion, and after *one* negative premise there can be no affirmative Conclusion.

(3). Each middle term, (of which there will be as many as there are premises,) must be once distributed.

(4). No term may be distributed in the Conclusion that was not distributed in the Premises.

155. It will result from these rules as in the case of simple Syllogisms, that

(1). After *two* negative premises no Conclusion.

(2). After *one* negative premise no affirmative Conclusion.

(3). After *two* Partial premises no conclusion.

(4). After *one* Partial premise no universal Conclusion.

156. We must consider, however that most of the Arguments that consist of a series of propositions which are to be regarded as Premises, are not Sorites—they have not the succession of Middle terms necessary to that Form. They consist rather, when stated in due form, of a series of propositions, with either one subject, or one predicate common to them all, as

n is P,  
m is P,  
o is P, etc.  
or, S is m,  
S is n,  
S is o, etc.,

in which case we have one premise stated in detail rather than a succession of Premises as in the Sorites.

157. The incomplete form usually called an Enthymeme, consists of *one* Premise and the Conclusion—the other Premise being omitted and left to be supplied by the hearer—thus, “A B is guilty, *therefore* he ought to be punished.” Here it is manifestly assumed that “whoever is guilty ought to be punished.”

158. Whenever a Premise is omitted, whether from a Simple syllogism or from a Sorites, it is very easy to restore it by means of the rules already given, though for this purpose we would state them a little differently.

RULE 1. *If the Conclusion be Universal Affirmative, both Premises must be affirmative and the Minor and Middle terms must be distributed.*

RULE 2. *If the Conclusion be Partial Affirmative, the Premises must be affirmative, and only the middle term needs to be distributed.*

RULE 3. *If the Conclusion be Partial Negative, one Premise must be Negative, and the Middle and the Major terms must be distributed.*

RULE 4. *If the Conclusion be Universal Negative, one Premise must be Negative, and all three terms distributed.*

159. The suppressed Premise is, of course, part of the syllogism, and is asserted by necessary implication in the assertion of the conclusion as a proposition that is to be regarded as proved by the asserted Premise.

160. We have considered Categorical syllogisms as having but three terms and two Premises. The Sorites may, of course, have as many terms as there are propositions, or as many terms as there are Premises and one more. And conversely, in the Sorites, as well as in the simple syllogisms, there must be as many Propositions as terms, and one Premise less than the entire number of terms. And as one of the Premises of a syllogism may be suppressed, so one or more of the Premises in a Sorites may be omitted from the statement of the argument. In fact, in a Sorites each alternate Premise and thus one half of them, may be omitted, and we shall have a series of Premises with no term common to any two succeeding ones, thus ;

A are B,

C are D,

E are F.

161. In this case there is a Premise to be inserted between the 1st and the 2d, the 2d and 3d, and we have B is C and D is E, to be supplied, and the rules for supplying them that have already been given will apply to all the cases in which the suppressed Premise is categorical. We shall see below, that a Comparative proposition has sometimes been suppressed, and that consequently nothing but a comparative Premise will complete the logical connection that was broken by the omission.

162. And in any case, when we have a fallacy in form of many terms, we can treat it as an abridged Sorites and restore the Premise that is needed for completing the formula as a Sorites. If it be really a fallacy of many terms and not merely an abridged Sorites, the proposition which is thus required will be either a contradiction in terms or a contradiction of one of the given Premises.

163. A proposition is sometimes thrown in as proof of one of the premises. It is called a *prosyllogism*, and together with the premise which it was designed to prove makes an Enthymeme, thus, A is B, B is C, (C is X), therefore A is C. Here we have C is X therefore B is C, for an Enthymeme. It implies that X is B.

164. It will also frequently happen that immediately upon the conclusion to a syllogism another conclusion is drawn from it. This is called an *episyllogism* and together with the conclusion from which it is drawn, makes an Enthymeme also. Thus, A is B, B is C, therefore A is C, consequently A is D, which implies that all C is D.

165. Again we sometimes have a series with the same term common to them all, thus A is *u*, B is *u*, C is *u*.

This is the form that is generally used in induction. Thus, dogs are carnivorous, foxes are carnivorous, wolves are carnivorous, hyenas are carnivorous. But dogs, foxes, wolves are the *canidæ*, therefore the *canidæ* are carnivorous.

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## SECTION II.

### COMPARATIVE SYLLOGISMS.

166. The reasoning that is based on Classification relates to the quality of objects, to what they are. We observe, we generalize, we predicate properties of classes, we include some objects in the classes we have made, and

exclude others from them. The whole process is concerned with the properties of objects, that make their *quality*, their essence, and their differences. And even properties which are accidental to the individual are made essential to the class by classification, and thus brought within the range of categorical reasoning. But nothing is said of *quantity*, or comparisons of time and place, intensity, etc., nothing of causation and law, nothing of relative properties and combining proportions, nothing of the relation of objects to the complex wholes of which they are parts.

167. There are those who think that every argument can be stated in one of the categorical formulæ already considered. This, I think, is an error. Take the following as an example.

Air is lighter than water,  
Water is lighter than earth,  
*therefore*, Air is lighter than earth. \*

This syllogism is at once seen to be good, and yet regarded as a categorical syllogism, it has four terms, (1) "air," (2) "lighter than water," (3) "water," (4) "lighter than earth." If we regard it as an abridged Sorites, as

A is B,  
C is D,  
*therefore*, A is D.

We may complete it, indeed, by introducing the proposition B is C, and then we should have

A is B,  
B is C,  
C is D,  
*therefore*, A is D.

But B in this case is "lighter than water," and C is "water," and the proposition *B is C* becomes "that which is lighter than water, is water," or "water is lighter than itself," which is absurd.



But aside from this difficulty, the Principles of reasoning by comparison are totally different from those of reasoning by classification.

168. Comparisons are of two kinds, (1) comparisons of objects, and (2) comparisons of ratios or relations; the former having three terms, and the latter four, either expressed or implied.

Comparisons with three terms are of two kinds, (1) comparisons of quantity and (2) comparisons of comprehension. Of the first kind we have  $A > B$ , etc., and in the latter, *A contains B*.

169. Objects may be compared in reference to four kinds of quantity, (1). Quantity of number, as more or less. (2). Quantity of time, as before and after. (3). Quantity of space, as above or below, farther or nearer (4). Quantity of intensity, as whiter or less white. But these four kinds of comparisons, which are apparently different, are all comparisons of *quantity*. Quantity itself is sometimes spoken of as of three kinds. (1). *Continuous* quantity when the object is considered as something substantial, but a unit, that is as one but larger or smaller, longer or shorter, etc. In this class we have not only simply the size of objects, but also time and space, they being considered as entities extending from event to event, and object to object. (2). *Discrete* quantity or number, in which objects are considered as many, that is as made up of parts, as five, six, etc., and one is hardly said to be larger or smaller than another, but rather, more or less, as six is more than five. (3). *Intensive* quantity in which we consider and compare not things, but properties, and make the comparison for the most part by the use of adjectives in the comparative degree, as "iron is *harder* than lead," "platinum is *heavier* than gold," etc. In all these cases we compare objects

with reference to their intensity in the possession of some one or more of their properties.

But the difference between these three kinds of quantity make no difference with the principles and formulæ of comparative reasoning,

170. A comparison may be one of equality or inequality, as  $A = B$ , or  $A > B$ . And all such comparative propositions may be converted.

(1). Simply, as  $A = B$ , then  $B = A$ .

(2). By change of the comparative adjective, as  $A > B$ , therefore  $B < A$ .

(3). But in the third place, if the comparison is indeterminate, as  $A$  is *as great as*  $B$ , there can be no conversion, for in this case  $A$  may be greater than  $B$  for all that is said of it, and therefore we cannot say that  $B$  is either equal to or less than  $A$ . We can only say for it that  $B$  is not greater than  $A$ .

171. The principles of comparative reasoning are obvious and well known.

(1). If two things are separately equal to a third, they are equal to each other, as

$A = B$ ,  $B = C$ , therefore  $A = C$ .

(2). If of three things one is greater than the second, and the second greater than the third, the first is greater than the third, and *vice versa*, as  $A > B$ ,  $B > C$ , therefore  $A > C$ , or  $A < B$ ,  $B < C$ , therefore  $A < C$ .

(3). If two things are both either greater or less than the third, no inference can be drawn with regard to their relation in either continuous or intensive quantity, thus  $A > B$ ,  $C > B$ , no inference. Or  $A < B$ ,  $B > C$ , again no inference.

172. But if we apply to continuous or intensive quantity discrete quantification, we can make a comparison of any two objects by means of a third, whatever may

be their relations in regard to equality or inequality. This quantification brings them within the domain of number, of Arithmetic and of Algebra, and constitutes, in its application to continuous quantity, Analytical Geometry and the Calculus. Thus A is twice as great as B, and B is half as large as C. This gives us the means of a comparison between A and C, that is, A and C are equal. But this always has reference to an assumed unit of measure, B, in the above example; and may therefore always be represented by numbers simply, as 3, 4, 7, 9, etc., and thus we have addition, subtraction, multiplication, division, etc.

The principles of this kind of reasoning fall so completely within the domain of Mathematics, that it does not seem worth while to pursue them any farther in this place.

173. There is, then, the other form of comparison, with three terms—three, if we regard them as comparatives, but *four*, if we regard them as categorical syllogisms—remaining to be considered under this head. They are not comparisons of *quantity* of any kind, but rather, as we have said, of *comprehension*. As “A contains or comprehends B,” etc., or “A is in B,” “B is in C,” etc.,

It is manifest that we cannot regard them as categorical without making them fallacies of many terms. If we complete them into Sorites we have the manifest absurdity: “B is whatever contains B,” or something of that kind.

174. And yet the reasoning is complete and satisfactory. It rests upon the self-evident Rules that

(1.) *Whatever contains anything contains whatever is contained in it.*

And conversely,

(2.) *Whatever is contained in anything is contained in whatever contains that thing.*

175. The syllogisms that come under these Rules are precisely the same in form as those that are founded upon relations of quantity.

Thus we may have the example, "John is in Paris; Paris is in France, *therefore* John is in France." But no one of the propositions may be converted. If John is in France it does not follow that France is in John. So too with a class; the genus *canis* contains the species fox; *therefore* "all foxes are *canidæ*," and "*some canidæ* are foxes."

176. Hence it is manifest that in comparatives of this class, the two terms that characterize its two members may be either (1) synonymous, denoting the same thing or (2) they will be, one more comprehensive than the other, but subordinate terms in ascending series. They cannot be either co-ordinate, alternate, or dispartate.

177. In the comparisons of things there are but *three* terms needed for a syllogism, and in fact there can be only three in a simple syllogism; with more than three it becomes a Sorites, with more than two premises. But in the comparisons of ratios or relations, there are *four* terms either expressed or implied, and there may be or not, one or even two more new ones added in the Minor premise.

178. We shall do well to consider these comparative syllogisms under two heads. (1.) Those in which there is a comparison of (*a*) quantity, of (*b*) time, of (*c*) place, as (*a*)  $3 : 4 :: 6 : 8$ , (*b*) this occurs when that does, (*c*) the boy is where his father is.

In the second class we have a comparison of *predication*, which we will explain more fully after we shall have discussed the first kind named, those of quantity, time and place.

179. When the comparison is of ratios as between numbers, we generally put them so that one ratio is equal to the other, as in the example  $3 : 4 :: 6 : 8$ . But it might be stated otherwise, thus,  $2 : 4 > 3 : 7$ , or the reverse,  $2 : 4 < 3 : 5$ . In this case, however, for any practical operations, it would become necessary to convert the ratio into a single number, as  $2 : 4$  is the same as  $2-4$ , or  $1-2$  of the assumed unit of measure.

180. When, however, the comparison is not of *ratios*, but rather of relations, we say that one relation is the same as the other, or *identical* with it, thus, "the seed is to the plant, as the egg is to the chick," the relation between the seed and the plant is the same as that of the egg to the chick.

181. It will be seen at once that identity of relations constitutes what we call an *analogy*. It is true that we speak of one object or thing as analogous to another. But the similarity is rather a resemblance than an analogy, when we compare objects one with another. However the confusion of terms is of no great importance.

182. We may have (1) the four terms given with the ratio of one part given, to find that of the other, or (2), *both ratios* given with two terms, to find a third that will be common to both.

If the four terms are given in the comparative proposition, the comparison is of the relations between them, and we have only to state explicitly for a Minor Premise, what the relation of one pair of the terms is, and then for conclusion we affirm that relation of the other pair thus :

$$3 : 6 :: 4 : 8 :$$

But three is half of six,

*therefore*, four is half of eight.

183. In case, however, only two terms are given, an-

other is implied, which is to be a member of both ratios. As "the boy is *where* his father is." Here "where" stands for the unknown third term, which is to be common to both ratios, and we complete by saying,

The boy is in the city,

*therefore*, the father is in the city,

and "in the city" is the third term common to the two ratios.

184. There is a very important difference in this respect among the comparatives that have or *imply* four terms. In all purely *mathematical* comparisons or propositions the wanting term, which here as elsewhere, must be common to both ratios or members of the comparative, must be consequent of one and antecedent of the other, whereas in the purely *real* comparisons, that is the comparison of things and not of numbers, the wanting term must be either antecedent or consequent in both members. Thus, if we have  $3 : x :: x : 12$ , or  $x : 3 :: 12 : x$ , we multiply the known terms 3 by 12, and have 36, extract the square root, and we have 6 for the value of  $x$ , and then we have  $3 : 6 :: 6 : 12$ , etc.

185. But if we say the boy is where is father is, the term expressing or making definite "where" must be predicate of both members, as "the boy is *in town*," "the father is *in town*." Or, when A occurs B occurs. At nine o'clock A occurs, at nine o'clock B occurs. But either the subject or the predicate must be common to both member of the comparative.

186. If we have one ratio given to find the other it will make no difference which is stated as the first ratio of the comparative, or proportion, although we shall, of course, be obliged to state the one that is known or admitted as the Minor Premise, and then affirm the same as the meaning or expression of the ratio or relation between the term of the other member, thus,

$$3:4::6:8.$$

we may say  $3:4$  is three-fourths,

*therefore*  $6:8$  is three-fourths,

or we may say,  $6:8$  is three-fourths,

*therefore*  $3:4$  is three-fourths.

Or the boy is where his father is,

the boy is in town,

*therefore* the father is in town,

or the father is in town,

*therefore* the boy is in town.

187. But when the ratios or relations are both given, the object is to find the common term, and that common term is, as in all, except mere mathematical proportions it must be, either the subject or the predicate of both members, and we shall not have the same liberty of statement and completion as we have when all four of the terms are given.

188. In comparisons of this kind, that is, comparisons of ratios with but two terms given and a third wanting, which is to be common to the two members, we have a certain relation between the two terms that characterizes the members. We have three cases.

(1). When the terms are mere synonyms, two names for the same thing, thus, "whatever can be said of common salt, can be said of chloride of sodium," *because* common salt is chloride of sodium.

In this case it can make no difference which member we complete for the Minor Premise. We can say, "salt is an antiseptic," *therefore* "chloride of sodium is an antiseptic," or the reverse, "chloride of sodium is an antiseptic," *therefore* "common salt is," etc.

(2). In the second place the terms may be two in a series of subordinates as quadruped, animal, etc., or the one inferior to the other in comprehension, as Paris, France, etc.

And here we may have two cases, (a) the case in which the subject of both is wanting, as "whatever is a quadruped is an animal," or "whatever is in Paris is in France."

In this case we must complete for Minor Premise, that member which has the narrower or lower sphere, as "horses are quadrupeds," therefore they are animals," or "John is in Paris, therefore John is in France." The other mode of completion, that is completion by finding a subject to the larger term for Minor Premise would involve an Illicit Completion.

(b). The other class of cases is that in which the predicate is wanting, as "whatever animals are, quadrupeds are" or more likely, "whatever may be predicated of animals may be predicated of quadrupeds."

In this case we must find a predicate to the larger term, and make that term and its predicate the Minor Premise, thus, "animals are organic beings subject to disease and death, therefore quadrupeds are" etc., otherwise we have Illicit Completion.

(3). In the third place we have the two terms co-ordinate and then one member must be negative and the wanting term will be a differentia between them. As "whatever matter is, spirit is not," and we may have "matter is divisible, therefore spirit is not; "spirit is spontaneous, therefore matter is not," etc.

189. The last form of this kind of comparatives, that with the predicates wanting, is not common in ordinary speech or writing; but they are not only of use, they are indispensable as means of completing and justifying formulæ in both Conditional and Disjunctive Syllogisms. See § 217, § 247, in Sections III and IV, of this Chapter.

190. We may state the principal of Aristotle's *dictum* in a form to meet both of these classes of cases.



(1). The subject to the subject of a Universal Proposition is subject to its predicate also.

(2). The predicate to the predicate of a proposition is predicate to its subject also.

The first of these forms has been already stated and illustrated, (§ 108.) But they are both obvious from a bare inspection of any series of subordinate terms extending from the individual up to or towards the summum genus, as N, horse, quadruped, animal, etc., the term *below* any one, is below any one that comes after it, and the term *above* any one, is above any that comes before it.

191. Aristotle's dictum in the form so often quoted, "Whatever may be predicated or denied of a class, may be predicated or denied of whatever is contained in that class," is really a comparative proposition. We have in the subject and predicate, or rather antecedent and consequent, regarding it as comparative, two terms, "predicate of a class" and "predicate of anything contained in the class," and then we have a third term which implies a double use, "whatever," equivalent to "that which," and we have "*that* may be predicated of anything contained in a class *which* may be predicated of the class."

192. This proposition we may treat in two ways.

In the first place, if we have any simple categorical, we can convert it into a comparative of the kind above stated, by introducing a relative term, making the terms of the categorical, modals or limiting clauses to the term which will be common to both members of the comparative.

Thus to take WHATELY'S example, "A negro is a man," therefore, "whoever kills a negro kills a man."

In this case we have a comparative inference or con-

clusion, which is certainly legitimate, for it affirms of "negro" (which by the premises was contained in the class "man,") only what is declared in the latter member to have been affirmed, or at least to be affirmable, of the class man in which it is contained.

193. But in the second place, we may take the comparative thus obtained, as a conclusion, and make it a premise, and supply for the indefinite term "whoever," any definite term, for the subject to a minor premise, and then we shall have the same term for subject of the conclusion with the predicate of the Major Premise for its predicate, thus:

Whoever kills a negro kills a man,

John kills a negro,

*therefore*, John kills a man.

194. Or, to take another example, and put the two parts together, we have a Syllogism or Sorites with four propositions.

The night is dark,

Whoever walks in the night walks in the dark,

John walks in the night,

∴ John walks in the dark.

195. As another form we may have two abstract terms, both derived from verbs, the one predicated of the other, as in an example before me, "Thought is existence." We may replace these abstract terms by the verbs from which they were derived, and supply as a nominative, the compound relative, "whatever," "whoever," etc., and say, "Whatever thinks exists," for that is but applying to an individual case the doctrine of Aristotle, in the second form in which we gave it, and applying in the second member, as a predicate, a term which in the simple categorical had been made, if not the superior and comprehending term, at least, a synonym, meaning the same

thing as the other ; and in either case the predicate in the simple categorical may be made predicate, or introduced as a modal to the predicate of the comparative.

196. There is still another mode of completing comparatives, which though often occurring in practice, I have never seen recognized or explained in any treatise on Logic. Thus, if we say :

Those that walk in the dark will stumble,  
The night is dark,

*Therefore*, those that walk in the night will stumble, we have what all persons will recognize as not only a valid and useful formula, but one that from its nature, must often occur in the application of general principles to practice in the affairs of life.

What we have actually done in completing the syllogism in the above case, is to substitute in the modal of a term in the major premise, another word which in the minor is declared to be its subordinate in the order of natural classification.

197. Now by recurring to the law for the change of terms or modals of terms, (§ 121), we have at once the law governing all such cases. The rules, it will be remembered, when reduced to the form we want, are,

(1) Lower terms may replace higher ones in (1) the subject of universal, and (2) the predicate of negative propositions.

(2) Higher terms may replace lower ones in (1) the subject of partial proposition and the predicate of affirmative ones.

Thus, in the proposition, "Those that walk in the dark will stumble," "dark" is part of the modal of a universal proposition. Hence, if we introduce "night," a lower term, we merely reduce the scope of the subject as we have a right to do.

198. Comparative propositions are interesting to us as being the origin of all figurative language. We call language *literal* when it describes any object as it is and implies no reality but that which is cognized, or necessarily implied in that which is perceived to exist. But the mind, in that form of mental activity which is called imagination or fancy, is often inclined to go beyond observed realities, and imagine or fancy others, thus creating a world of unrealities, or *entia rationis*. This is in some measure necessary and unavoidable, since we see much that we cannot explain without resort to something that is not seen, which, however, if it were real, would serve to explain what we do see. For example, we see that as soon as the sun appears above the horizon all things are visible and luminous. How is this? At present we do not know. But the phenomenon is explained by supposing light to be a substance that is emitted from the sun with such astonishing rapidity, and in such overwhelming abundance that it fills at once the whole hemisphere of the skies. Hence, we speak of light as a substance, of its nature, its reflection, its refraction, its chemical effects etc., etc., as though it were a real substance.

199. And among things that we know, comparisons are constantly made and then transformed into figures of speech. Thus if we say "Washington is the father of his country," or still more briefly in speaking of Washington, omit his name and call him "the father of his country," we imply, and have already made the comparison "As a father to his family, so Washington to his country."

200. If we expand the relation in the first member, we have the "fable," the "parable," or the "allegory," or in modern times "the novel." If we drop one term and say as before, "Washington is the father of his country," we have the simile. If we use one term only as "that fox,"

it is a metaphor, and when an abstract term is thus used in the place of a concrete, as "light" in the example just described, we have the metonymy.

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### SECTION III.

#### CONDITIONAL SYLLOGISMS.

201. Every object of thought is, and is considered as a cause; and with one exception, every object is and is considered as an effect also. The exception is the First Cause, the Uncaused Cause.

The word cause is, however, used in several senses, and every object considered as an effect has had several causes, that is, several different kinds of cause.

(1). There is the *efficient* cause, that from which efficiency proceeds.

(2). There are *occasional*, exciting, or procuring causes which set the efficient cause at work, as in the case of an explosion of gunpowder, the gases are the efficient cause, but the spark that ignites the powder is the occasional cause.

(3). There is the *instrumental* cause or means, as the pen with which one writes, the instruments or tools with which one works.

(4). There is the *material* cause, the matter out of which any thing is made, as when we say that iron is the chief cause of tools and machinery. The Scholastic writers used to hold that the *essentia* of a genus are its material cause.

(5). There is the *formal* cause; as the mould which gives shape or form to what is cast in it, and makes the metal poured in to be a plow-beam, a pinion, wheel, etc.,

etc. The Scholastic writers used to call the differentia of a species its formal cause.

(6). There are sometimes *conditional or circumstantial* causes. These are hardly causes at all, but rather merely antecedent conditions. Thus a man's being alive to-day is hardly a cause of his dying to-morrow or on any subsequent day, but it is an indispensable condition. Facts of this kind are often spoken of, or written about as causes.

(7). Finally there are what are called *final* causes, which are the object or purpose for which anything is done. Only moral beings can act from final causes, and some such cause enters into the production of all the results of voluntary action.

202. The existence of a cause of any one of the kinds named, is some proof in the way of demonstration of the reality of the effect which it tends to produce, and the existence of a combination of causes of several kinds may become an absolute proof. But the investigation of these combinations and their varied forces, depends so much upon a knowledge of the subject matter, and the department of knowledge into which they enter, that no discussion of them except in connection with the scientific treatment of the matter itself, could be of any practical value. For the most part, the existence of a cause for an event or fact is regarded as no more than a *probable* argument in its favor. It serves to account for and explain the existence of the fact or the reality of the event, rather than to prove it.

203. On the other hand an effect is always *positive* proof of a cause. The very word effect implies a thing produced, and of course, therefore a producing cause or agent, that is, an efficient cause. This cause may have been a *permanent* cause, as the earth is a permanent cause of the falling of bodies since it *always* attracts. It

may be only *transient*, that is, one that acts occasionally only, as powder in exploding, and then the result must have an occasional cause as well as an efficient one; and in case the agent were a personal being, there must have been a final cause also.

204. From the study of the nature of any effect, we are able not only to see that it had a cause, but also something of the nature and properties of the cause. The cause that contrived and made a watch, for example, must have had skill, intelligence, purpose, and must therefore have been an intelligent personal agent, and most likely a human being. The machine that cuts an iron bar at a blow, and in an instant, must have great strength. The object that welds iron or volatilizes gold must have great heat, etc., etc.

205. Not only is every object in nature connected with some others that precede it as its causes, but the properties of objects, and each one of them how numerous soever they are, indicates something of the properties and essential nature of the objects that were its causes. The melting of solids not only implies the action of other natural objects, but it implies also that they were in a heated condition, etc. And every property, condition and feature of the effect indicates something concerning its cause.

206. In the physical sciences, an invariable antecedent is generally spoken of as *the* cause of an event. But in this case there is seldom any distinction between the efficient and the occasional cause; or rather the two are, for the most part, confounded. But we attach no especial importance to invariable antecedence until we can see some casual relations between the antecedent and the consequent. And even in the investigations of Natural Science, although a recognition of final causes, and the

argument from them has been much decried ; it is a fact that scientific men are more and more returning to the use of them. It was the design of the Creator that the ox should feed on the grass of the field, therefore the peculiar structure of the teeth, the many-plies, the prolonged alimentary canal, etc., etc. It was the design that the cat family of animals should feed on flesh and catch their prey by springing upon it, therefore the retractile sharp claws, the canine teeth, the single stomach, agile frame, long tail, etc., etc.

207. But the word "cause" is used in logical discussions in still another sense, it denotes any premise *causa cognoscendi* or *credendi*, whereas the causes we have been speaking of are called *causæ essendi*, those that make a thing to be, and not those that make us believe or know that it is. In this connection, that which is physically an effect, is for the most part logically the cause. That is, the effect is the proof or logical cause of our believing the existence of the physical cause, rather than the reverse.

208. Any Enthymeme, which, as before explained, is a Conclusion with one premise, may be stated conditionally or hypothetically, by making the premise the antecedent or logical cause of the conclusion. Thus A is B because C is B, or conditionally. If C is B, A is B.

209. Regarded in reference to its *form* alone, therefore, a conditional proposition is merely an Enthymeme stated conditionally, the premise being stated first in order, and constituting what is called the *Antecedent*, and the conclusion being stated as the *Consequent*, the implied or supposed premise being called the *Sequence* ; the Antecedent being the logical cause.

210. A Conditional Syllogism, therefore, differs from an Enthymeme only in the mode of statement. If one



premise is known and universally assented to, as is often the case, and one wishes to make emphatic the fact that the conclusion cannot be denied or refused, if the other premise is admitted, he is likely to make that premise the antecedent in a conditional proposition. If A is B, A is C. He will then proceed to show that A is B. Or, in case he wants to refute any proposition, as A is B, he will select some other proposition, as A is C, which cannot be denied if it be admitted that A is B, and state them as a conditional, thus if A is B, A is C, and then proceed to show that the proposition A is C, is untrue or absurd, then infer that A is B is untrue, or the truth of the contradictory of A is B.

211. This makes what are called the two ways of completing a conditional Syllogism, (1) by affirming the Antecedent to prove the Consequent. (2). By denying the Consequent to disprove the Antecedent. We may represent this to the eye as follows:

If A is B, C is D.

$\overbrace{\hspace{10em}}$	
$\overbrace{\hspace{4em}}$ A is B, . ∴ C is D,	$\overbrace{\hspace{4em}}$ C is not D, ∴ A is not B.

The first method, that by affirming the Antecedent, is called the *Constructive* method, the method by *Position* or the *modus ponens*; the other, the method of denying the Consequent, is called the *Destructive* method, the method of *Amotion* or the *modus tollens*.

212. Not the argument, however, but only one of the premises is conditional; the conditional proposition being the Major premise, and a compound of two simple categorical propositions, of which one of them, the Consequent, is asserted to be true on the ground that the other is true.

We may illustrate these methods by the familiar example:

If John has a fever, he is sick.

John has a fever,

*therefore*, he is sick.

Or, in the other method,

If John has a fever, he is sick.

But, John is not sick,

*therefore*, he has not a fever.

213. If, however, we affirm the consequent and say, "John is sick," "therefore he has a fever," we commit the fallacy, in form called the fallacy of *position*. That is, we affirm the consequent, and therefrom infer the truth of the Antecedent, which is illogical and invalid. Or, if on the other hand, we deny the Antecedent and say, "John has not a fever," and infer, therefore, "he is not sick," we commit the fallacy of "*amotion*." The fault is the same, fundamentally, in both cases, John may be sick from other causes than the one assigned; or more generally, as any Conclusion may be proved by more than one Premise, neither does the denial of any one Premise disprove the Conclusion nor does the affirmative of the Conclusion prove any given Premise to be true.

214. Sometimes, however, the Conditional is so stated that the completion of an argument may be in either of the methods, those above characterized as illicit, as well as those that are always valid, thus, "Only in case God has commanded the observance of the Sabbath, is the use of it for secular purposes a sacrilege,—or, "if God has commanded the observance of the Sabbath, *only* is it sacrilege to convert it to secular purposes," the word *only*, showing that the Consequent can have no other Antecedent. In this case there can be no fallacy either

of "position," or "amotion." We may say, (the truth of the assertion is not here under consideration,) "God has not commanded," etc., therefore the secularization of the Sabbath is no sacrilege, or "the secularization is a sacrilege, *therefore* God has commanded it.

215. As the Major Premise of the Conditional syllogism is but an Enthymeme, stated conditionally, we may regard it as an Enthymeme, and complete accordingly, in which case the proposition that is needed to complete the syllogism, is the Sequence of the Conditional. And it is often important to complete the Formula in this way, in order to display the Sequence that is really assumed. This Sequence, regarded as a proposition, will sometimes be manifestly untrue, and then as a Sequence it is nothing, or as we say, there is no connection between the Antecedent and the Consequent. Thus, a gardener once refused to plant seeds on the ground, as he said: "If we plant them in the new of the moon they will not grow." Here was manifestly an assumption of a Connection or Sequence, between the state of the moon and the growth of the garden seeds, a connection which most of us would deny.

216. If there are four terms in the Conditional, the Sequence is double, or we shall be obliged to insert two new propositions. As if A is B, C is D, thus we can complete only by saying,

All C is  $\neg$ A,  
All A is B,  
All B is D,  
*therefore*, C is D,

217. The proposition that was needed in the case of Conditionals of three terms only, and one of them in the case of Conditionals with more than three terms, may be a comparative judgment, as well as Categorical,

thus, "if the air is lighter than water, it is lighter than earth." Because "water is lighter than earth," is in this case obviously the required Sequence. And again, if vice is voluntary, virtue is voluntary, *because*, "What may be affirmed of vice, (in regard to volition), may be affirmed of virtue."

218. In drawing an inference in the destructive method we must note carefully that we are entitled only to the contradictory of the Antecedent, not its contrary. And, in fact, we are liable to the fallacy of illicit process in the constructive method also.

219. With three distinct terms there may be four positions of the terms in relation to one another, thus,

If A is B, B is C.

If A is B, C is B.

If A is B, A is C.

If A is B, C is A.

Now, suppose we have,

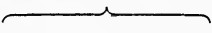

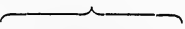
If A is B, C is B,

We need All C is A for Minor Premise, then we have All A is B, All C is A, therefore, All C is B.

220. But if we have, If A is B, B is C, we cannot have for Consequent All B are C, unless B is an individual term, for we should have an Illicit of the Minor. So, too, with the form, If A is B, C is A, if C is a general term, a universal Consequent will involve either an Illicit of the Minor, or an Undistributed Middle.

221. In the case of the Destructive mode we find that the same sequence as the Constructive method requires, is all that is needed; thus,

If A is B, C is B.

	
 A is B, ∴ C is B,	 C is not B, ∴ Some A is not B.

The Minor Premise required is,

All C are A, and we have,

All A are B,                      and

No C are B,

All C are A,

All C are A,

∴ All C are B,

∴ Some A are not B,

and no A are B, would be Illicit of the Minor. And yet it is a fallacy that not unfrequently occurs. If, however, we can have a universal conclusion without Illicit Process, we are of course, entitled to it.

222. What we have thus been speaking of, may be called the *obvious* Sequence that is, the Sequence that is implied in the formula itself, and can be found by the process indicated. And the Sequence thus found, will be a general proposition. But there will often be *special* reasons for the connections that are not stated or intimated. In that case we are at liberty to reject the conditional, as the basis of reasoning, although there may be a good Sequence between them. Thus, I happen to know that "if John has a letter, it is from his father." No obvious or general Sequence can be found for such an assertion. I cannot, therefore, make it the Major Premise of an Argument, by which to prove to others that the letter is from his father, notwithstanding I should show that he has one. My conditional assertion therefore, must be regarded as only an assertion, the Sequence to which, as well as the Antecedent, needs proof.

223. In some cases we have what is called a *Compound* conditional, in which both the Premises are stated Conditionally, as, If M is P, and if S is M, S is P, or we may have different terms, as if A is B, and if C is D, E is F.

$$\left. \begin{array}{l} \text{If A is B,} \\ \text{If C is D,} \end{array} \right\} \text{E is F.}$$

In this case *all* the antecedents must, of course, be af-

firmed and proved, or the Consequent is not established as a Conclusion.

224. It is said that the establishment of *one* of the antecedents, creates a probability of the truth of the Consequent, and these probabilities or "chances," as they are called, are subject to mathematical computation, when they have once been estimated. The only case, however, which I shall refer to here, is that in which the antecedents are regarded as only probable, in which case, the consequent is *less* probable, than any one of the antecedents, rather than more. In this the Compound conditional differs from what is known as the *Cumulative* Argument, of which I shall speak in the next Section.

225. Thus, for an example, suppose a certain result in a group of chances depends upon the two conditions, (1) a throw of a certain number as a *size* and (2) upon a certain combination of the pieces when the die is thrown. Now the probability of that particular side of the die falling upward is as 1 to 5 against, or 1 in 6, or one-sixth. The probability of the pieces being in the requisite position we may call 1 to 3 against, or one-fourth. The probability of the result is not the sum of these fractions, five-twelfths, but their product, or *one-twenty-fourth*.

226. Again, we have *Continuous* Conditionals, in which the Consequent of the first Conditional is made the antecedent of the next and so on, as If A is B, A is C; If A is C, A is D, If A is D, A is E, etc. If the Sequence is good in all these cases, we may, of course, cancel out all between the first Antecedent and the last Consequent and have If A is B, A is E, and treat it as if there had been no intervening members. This is virtually a Sorites stated conditionally, whereas the simple conditional is an Enthymeme so stated.

227. From the nature of a Conditional, it follows that

we may always take it *per contra*, or by contraries; thus if we have, If A is B, A is C; it will, of course, be true, also, that if A is not C, A is not B. If, however, one of the members only, as a categorical, is negative, as, If A is not B, A is C, we are to regard the Conditional as a Disjunctive stated conditionally. This will make no difference however, with the reasoning, the method of completing the argument, etc.; for in fact, we are obliged to put Disjunctives into this form in order to test their validity in reference to their implied matter.

228. We may have of course, a conditional modal in a Categorical syllogism, thus, All M are P, then if A are S S are M. and we shall have of course the same modal in the Conclusion, If A are S S are P, In this case, however, the reasoning is none the less categorical on account of the modal; it is not made in any sense conditional thereby.

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#### SECTION IV,

##### DISJUNCTIVE SYLLOGISMS.

229. Wholes are of several kinds, and the relations of parts to their comprehending wholes and to each other are of as many kinds. Thus, a genus is a *logical* whole, made up of species as parts. and in like manner the species is made up of individuals as parts. In mathematics a product is a whole made up of factors; an amount is a whole made up of several sums by addition; these are called mathematical or *numerical* wholes. Logic treats of the relations of parts to logical wholes, and Arithmetic and Algebra, of the parts to their wholes and to one another in mathematical wholes.

230. But besides these two kinds there are what are

called *collective* wholes, in which the whole is made up of parts sustaining relations to one another, and to the complex whole, quite different from those already stated. In this kind of wholes, the whole often has properties which no one of the parts had separately, and it will often happen that properties that may be predicated of each of the parts separately, cannot be predicated of the whole taken together. The union of parts in these cases is a synthesis, not a mere addition or multiplication.

231. Thus, every chemical compound is of this kind. It has properties which no one of the parts or elements had, and each element loses some of its properties on entering into the combination. So a family, a state, a society, a committee, are collective wholes, and much can be said of them that cannot be predicated of any individual of them taken separately.

232. Now, of all the modes and formulæ of reasoning those that depend upon this relation are least understood, and have been least of all reduced to rule. In fact, there are few or no general rules that can be stated and reduced to formulæ. It is probable that a society, a family, etc., made up of christian men, will act in accordance with the principles of Christianity as they understand it. But we have no way of proving to a certainty, how they will act from a knowledge of their individuality. And it is well known, that in chemistry but very little can be predicted beforehand of the nature of a new compound, from any knowledge we may possess of the nature of the elements. Some things we can know, as for example, if it contains nitrogen, it will be easily resolved, if it contains carbon it is likely to be combustible, etc., etc.

233. Every object we see or can think or speak of, is



part of some collective whole. Every tree is a part of the *landscape*; every chair, table and sofa is part of the *furniture* of the room, the eyes, nose, etc., are parts of the *features* or *face*, every star is part of a constellation, and the constellations themselves are each of them parts of *the heavens*.

234. But as so little is known of the laws of combination and synthesis in collective wholes, no formulæ or canons can be given for this kind of reasoning. As we have said, however, any species in a genus is a part of the genus, and we may have a form of reasoning based upon this relation, different from those already considered, and known as the *Disjunctive* syllogism.

235. From the laws of classification and division, stated in a preceding Chapter, it follows that if an individual included in any genus is not contained in one of the co-ordinate species, it must be contained in another. Hence, we have the disjunctive assertion,

Either  $n$  is  $A_1$  or  $n$  is  $A_2$

or, as it is more usual to state it, " $n$  is either  $A_1$  or  $A_2$ " in which  $n$  denotes any individual  $A_1$  and  $A_2$  denotes co-ordinate species.

236. The Disjunctive Proposition, when used as a part of a Syllogism, is considered the Major Premise, and by denying one of the members we establish the other, thus,

Either  $n$  is  $A_1$  or  $A_2$

But  $n$  is not  $A_1$

therefore,  $n$  is  $A_2$

This is called the *Constructive* Method. or the *modus tollente ponens*.

237. Or, if the terms are really co-ordinate and not *alternate* merely, we may complete by affirming one member of the disjunctive, and get for the conclusion, a contradiction of the other, as,

Either  $n$  is  $A_1$  or  $A_2$

$n$  is  $A_1$

therefore,  $n$  is not  $A_2$

This is called the *modus ponente tollens*, or the destructive method.

238. If, however, the terms are not co-ordinate, as  $A_1$  and  $A_2$  but alternate, this method of completion will be fallacious, since the same individual may be in two or more alternate species, as, "Coleridge was *both* a poet and a philosopher." If, therefore, we should say, "he was either a poet or a philosopher," we could not say "he was a poet, and therefore he was not a philosopher."

Of course, the  $n$  or the subject of the members in the above formula, may as well be a species or class as an individual. In this case the predicates  $A_1$  and  $A_2$  would denote genera instead of species.

239. Or again, we may have the predicate the same in both members, and the subjects different; thus, either  $A_1$  is  $p$ , or  $A_2$  is  $p$ . In this case,  $A_1$  and  $A_2$  will denote two parts or species, and  $p$  a property which must be a differentia of one or the other species, as, "either mind or matter is *eternal*," either mind or matter is "*spontaneous*."

240. The methods of completing, and the limits of their application are the same as in the other forms of the disjunctives.

(1). When there are but three terms, one common to both members, and the others different in each, the two are called co-ordinate, and taken together must make up the sum of the divided whole. And this they can do whether co-ordinate or alternate parts, the only difference being that in the former case no individual can be common to the two, while in the latter case there will be one or more common to both. Hence, the terms are

virtually positive and negative in relation to each other.  $A_1$  and  $A_2$  are the same as  $A$  and non- $A$ . Or if we have two positive terms, as  $A$  and  $B$ , they are  $A$  and non- $A$ , or  $B$  and non- $B$ ;  $A$  being equivalent to non- $B$ , and  $B$  being equivalent to non- $A$ .

(2). But we may have more than two co-ordinate terms. Thus,  $n$  is either  $A$ , or  $B$ , or  $C$ , etc., indefinitely. In this case, any one of them, as  $A$ , may be taken for positive, and the others *together* will be its negative, or non- $A$ . And in completing the syllogism, we first deny one member, and then get for Conclusion the others stated disjunctively, thus,

either  $n$  is  $A$  or  $B$  or  $C$ ,

$n$  is not  $A$ ,

therefore  $n$  is  $B$  or  $C$ .

Then again,

$n$  is either  $B$  or  $C$ ,

$n$  is not  $B$ ,

therefore  $n$  is  $C$ .

It can make no difference how many co-ordinate terms there may be.

241. This formula is the basis of a method of reasoning sometimes called *abscissio finitimi*, which is of great use in some departments of science. Thus in Chemistry, the chemist having a substance to analyze, says virtually, it is either this, that, or the other, naming the four or five groups into which all substances are divided with reference to their chemical composition. He treats it for one group and says as the result, it is not in this, it is not an alkali, for example. He has thereby reduced the number of groups in which it may be found by one. He then tries for another, say acid for example, until he finds that in which it is contained. In this way he saves the time and labor of testing for each substance in the group

alkali, acid, etc., for each of which as much time and labor might be required, and in some cases more would be required for each separately, than is needed for the application of the test that determines the group.

242. It is not necessary nor is it customary to draw out the argument with all the detail and completeness of form that we have described. This, in fact, is seldom done; but the steps that require special consideration are taken, and the rest implied, but omitted, because not requiring special attention. If however, there is any uncertainty or question as to the result when it has been obtained, the process is reviewed and the implied steps one after another, are called up for inspection and criticism, and no one can be thoroughly master of this method of investigation without understanding the fundamental laws of the Disjunctive Syllogism.

243. The disjunctive may always be converted into a comparative, by substituting the contradictory of either one of the members for the antecedent, and using the other for consequent, as, either A is B or C is B. If A is not B, C is B, or if C is not B, A is B.

244. In this way we may regard them as parts of an Enthymeme, and complete them as already seen, and the premise that is needed will exhibit the contradictory opposition of the co-ordinates; as in the above given example, we should get, all non-A is C, and all non-C is A. Hence A and C together make up the whole.

245. As a formula, the Disjunctive is valid only on condition that all the co-ordinate parts are mentioned, and we have as many members as there are co-ordinate parts. Otherwise the individual  $n$ , as in the first case, might be in the class not mentioned, or as in the second, the term might be a predicate of some other object than those previously denoted by A and B; that is, it might

be a predicate of part of the individuals contained in one of those species alone, or of some that are contained in each.

246. When this condition, namely, the mention of all of the parts, is not fulfilled and completed, we shall have the fallacy in matter, called *non-excluded middle*; that is, if we mention two classes only, when there are three, we omit a third class, a *tertium quid*, or middle class within which the individual *n* may be contained. Hence, between any two contradictory propositions, it is customary for logicians to say there is *excluded middle*; that is, there can be no proposition expressed in the same terms that will be true while the two expressions are both false. Thus, if I say that "all men are wise," and "some men are not wise," there is excluded middle, and one of the propositions must be true. But if we say, "All men are wise," "no men are wise," there is not excluded middle, and the propositions "Some men are wise," and "Some men are not wise," may both be true, while both the universals are false.

247. The Excluded Middle can always be made to appear in disjunctives by stating them conditionally, and then regarding them as Enthymemes, completing them into Categorical syllogisms. They can be stated conditionally by making either member negative, and stating it as the antecedent, thus, "If *x* is not A, it is B," or "If *x* is not B, it is A," or again, "If A is not *x*, B is *x*," or finally, "If B is not *x*, A is *x*."

248. We have then four cases, or rather two cases, each of which may be completed in two ways.

- (1)            If *x* is not A, *x* is B,  
                  All *non-A* is B,  
                  *x* is not A,  
                  therefore, *x* is B.

In this case the required premise is "All non-A (i. e. not A), is B," that is, all of X, the divided whole, which is not in A, is in B.

- (2) If  $x$  is not A,  $x$  is B,  
       All non-B is A,  
        $x$  is non-B,  
       therefore,  $x$  is A.

Here we have, all of X that is not in B is in A, showing as before, that A and B must be not only two co-ordinates, but the only co-ordinate parts of X, on which the disjunctive,  $x$  is either A or B, is based.

- (3) If A is not  $x$ , B is  $x$ ,  
       whatever A is not, B is,  
       A is not  $x$ ,  
       therefore B is  $x$ .

Showing as the case requires, that  $x$  is a property that can be affirmed of whatever is included in the genus X, the divided whole, and is not included in the species or part A.

- (4) If A is not  $x$ , B is  $x$ ,  
       whatever A is not, B is,  
       B is not  $x$ ,  
       therefore, A is  $x$ .

In this case the supplied Premise shows the same relation of  $x$ . It is a property that is differential between the species A and B, into which the genus X is divided.

249. In some cases, and those not unfrequently occurring, the divided whole, or genus itself, will be used as the subject of the members of the Disjunctive, as "All substantial things are either matter or spirit," "All men are Christian or practically heathen," "All money is either paper or coin," etc., etc.

250. In such cases, the minor premise, whether we complete in the *modus ponente* or *tollente*, must mention the

divided whole, or if not, it assumes it by necessary implication; thus, "These men are *not* Christians, therefore," etc. "All *substantial* things are either matter or spirit," we have "the mind of man is not matter, therefore," etc., in which case we assume by necessary implication that it is a "substantial thing."

251. What is known as the *cumulative* argument, or the argument from circumstantial evidence, depends for its force on the relation of parts to a whole. In this case the force of the argument is said to depend upon the concurrence.

252. The Compound Conditional and the Cumulative argument differ in the following points:

(1). The Probable argument is used to prove an event or fact which either has not taken place, or which, if it has, is not known to have taken place. In the Cumulative argument, on the other hand, the event or fact is known to have taken place and the Argument is used to prove something concerning one of its causes or antecedents.

Thus, if a ship is lost at sea, and one-half of the passengers drowned, and the chances that a certain person was on board is one to three, or one-fourth, the *Probability* that he was among the lost is one-eighth. But, in one of the most common cases of the use of the Cumulative argument we may suppose that a crime is known to have been committed, and a certain person is suspected. In this case, we collect all the facts or "*Circumstances*" as they are called, that can be urged as proving or tending to prove his guilt. The event is known, and what we are trying to find is the Agent who caused it.

(2). In the second place; in the Probable Argument the uncertainty attaches to the antecedents if the event be future; whereas, in the Cumulative argument there

is usually no uncertainty about the antecedents taken separately, but only about their connection with the event that has occurred. In the case just supposed, *one* antecedent was indeed certain, the loss of one-half the crew, but the other, whether the person in question was on board is in doubt. In regard to the other example, many of the "circumstances" are obvious, and admit of no doubt, and the only question is, whether they connect the supposed criminal with the act or not.

(3). In the Probable argument the antecedents must be *all* enumerated and taken into the computation of the probability of the event; but in the Cumulative argument there is no such necessity. In fact the "circumstances" are seldom, if ever, *all* stated, and of course, they may be innumerable.

(4). Finally: In the Probable argument, *all* the antecedents must be true or proven, or the consequent will not be proved at all; and all the force of the others go for nothing if any one of them fails to occur or be fulfilled. Thus, in the example given; the loss of the ship, were it ever so certain, would not endanger the life of the person in question, provided he was not on board. But, in the Cumulative argument, it will often happen that some one or more of the "circumstances" that we should expect to be connected with the proposition to be proved is not only not proved, but is shown to have been impossible or never to have taken place, and yet the conclusion is regarded as established, nevertheless.

253. The Probable argument, as I have said, may be used to prove *past* events that are not known to have taken place as well as those that are in the future. So, too, the Cumulative argument, though it is used for the most part with reference to *past* events, may be used in regard to those that are future. When we know of cer-



tain causes *that are at work*, all tending to the same result, we can argue from those causes, their nature and tendencies, to the effect which they are likely to produce; and the argument gains accumulated force from any increase of their numbers instead of being weakened by it.

254. The force of the Cumulative argument depends upon that relation of the parts to a collective whole, whereby it often happens that the whole is more than the sum of the parts, almost realizing Hesiod's paradox, of "a half that is more than its whole." Three sticks that will not either of them stand alone will often stand very firmly if they are bound *against* each other, and sometimes all the more firmly the greater the weight that presses upon them.

255. The same thing will also often happen in estimating the force of testimony. Thus, suppose two men, notorious liars, should come in and relate a story; there is no doubt of the fact that they so report, but the connection between the statement of either of them and the truth of what one says may be very slight, so that his statement, taken alone, would be worth but little attention, while the concurrence of another man without collusion and as an independent witness, though no more veracious than the first, would make the fact attested very certain.

256. The following has been suggested as a method of computing the force of the concurrence in arguments of this kind. Estimate the value of each connection of the circumstance with the fact to be proved in a fraction of unity. Take for each fraction its complement in unity, multiply the fractions thus obtained and then subtract that product from unity, and we have a representative of the resulting force of the concurrence of the

circumstances in a Cumulative argument. Thus, let the probabilities of each be 1-2 and 1-3, the complements in unity will be 1-2 and 2-3; their product 2-6, and subtracted from unity we should have 2-3 as the resulting probability in this case. The more numerous the circumstances, the greater of course the probability, and the more nearly does it approach certainty by this method of computation. But, in the case of the mere compound conditional, as we have already seen, the more numerous the antecedents the less the approach toward certainty. And thus while in the latter case, each new condition weakens the force of the argument, in the cumulative argument, on the contrary, each new fact or circumstance renders it stronger.

257. When the members of a Disjunctive are of the nature of contradictories, so that if either is false the other must be true, and both of them are so related that as Antecedents in a Conditional, they will have the same consequent, the form of the Argument is what is called a Dilemma.

Æschines, in his attack on Demosthenes, puts the statement thus, "Demosthenes did or did not take part in the public rejoicing; If he did, he was inconsistent; if he did not, he is unpatriotic, and in either case unworthy of our confidence." Or, as we sometimes say, the man that did this is either a knave or a fool, and, if either, is unfit for his position.

258. The Dilemma, however, is rather a Rhetorical Figure than a Logical Formula. It is not so much designed to prove anything, as to give point and pungency to what needs no proof.

## PART III.

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*PRACTICAL.*



## PRACTICAL LOGIC.

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### LANGUAGE AND ARGUMENTATION.

259. It has been sometimes held that Logic is a purely *formal* science, that it deals with forms of thought and the formulæ of reasoning only, without taking note of the subject matter, or receiving any modifications from it. It is in this respect, say the advocates of this view, like mathematics, which treats of triangles and not of triangular substances, with units, not individuals, with space, not extended objects, with motion, not moving bodies; and the truths and doctrines which it establishes are in no way affected or modified by the nature or the differentia of the concrete objects or subject matter to which they may be applied.

260. And this view of Logic is certainly true so far as we have already gone in this treatise. The elementary propositions A, E, I and O, are the same in all their properties and relations, whatever may be the nature of the object denoted by the term that is made subject in the proposition. So likewise, the formulæ, the syllogisms whose construction we have considered, are valid, alike for all subjects, whatever may be their nature, if only they can be brought within the form of the syllogisms, or stated in its terms. And yet without looking beyond the form, we can never detect a fallacy in Diction, Matter or

in Method, and without the means of detecting these, (since we never reason except in the use of words), Logic would be of no practical value, even if it could be said to have theoretical certainty.

261. In proceeding to treat of the practical application of the formulæ and principles already discussed, it must be understood that I can state only the most general principles, or rather the principles in their most general forms; since in every department of knowledge there arises the necessity for some modification of them in their application, in consequence of the nature of the subject matter.

262. I will, however, proceed with such a statement of the general principles of Applied Logic, or the Logic of Proof, as is practicable without going into such a discussion of other matter as would make it more proper to call this treatise a cyclopedia of general knowledge, than a Text Book of Logic.

263. But before proceeding to the consideration of the methods of Applied Logic that are determined by the nature of the subject matter and the circumstances under which the formulæ are used, we must consider the nature and use of language and the fallacies that may arise from the improper, or defective use of it.

## CHAPTER I.

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### THE LOGIC OF DICTION.

264. The question has often been proposed and discussed whether we can reason without language? If the question be whether we can reason without *using* language it clearly cannot be answered in the negative without excluding from what we designate as "reasoning" the elementary processes of analysis, abstraction, generalization, &c. If, however, the question be whether we can reason without *producing* language, it is sufficient to say perhaps that language *is* produced by acts of reasoning, and that probably it would be impossible to perform those acts without producing some signs or symbols that would represent the things that we are reasoning about.

265. But without entering upon a discussion of this question in either of its phases, it is manifest that language sustains three relations to our general subject sufficiently important to require a discussion of the general subject of the Logic of Language in reference to methods and processes of reasoning; these relations grow out of the following facts:

(1). Without the use of language it is impossible to state or express the mental processes of reasoning so as to make them intelligible or influential upon other minds.

(2). The ambiguities of language and the habits in the use of words, the *usus loquendi* of any dialect, exert a very important influence upon the course of our thoughts and often mislead the mind in its pursuit of truth.

(3). Every word and combination of words expresses and represents a fact or state of consciousness, and thus by a process of evolution we can make language itself a means of developing and analyzing these facts and thus find a bridge from the phenomena of consciousness within, to the metaphenomenal facts without—a sort of transcendental Logic.

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## SECTION I.

### WORDS AND SENTENCES.

266. Language consists of separate words joined together by some law of combination so as to denote things in the relations which they appear to sustain to each other.

267. What shall constitute a word is a matter of dialect merely. In Chinese each syllable is a word. In our language we combine several syllables into a compound word, each syllable, in all probability having been once a separate and distinct word. How far this matter of combination may have gone, or shall go hereafter, is a matter of no importance to our present purpose.

268. Words are primarily divided into two classes, (1) nouns, denoting things, and (2) all other words, which serve to show the relations, conditions and actions, of the things denoted by the nouns.

269. Nouns, may be, in quality, either (1) individual, (2) common, (3) abstract, (4) collective, (5) privative, (6) negative.



270. Other words, which we may call adjunct words, are, for our present purposes, most conveniently divided into five classes.

(1). Adjectives, which qualify nouns, and with a *common* noun, make a specific term, as "man," "*white* man" with a proper noun or individual term they limit its scope to some accidental state or mode, as "John Doe (sick-in-bed)."

(2). Verbs, which, with the exception of the substantive "to be," denote the actions which things are performing.

(3). Adverbs, which sustain the same relation to verbs that adjectives do to nouns.

(4). Prepositions, which always, with perhaps the exception of "of," show the relation between an action and some one of the causes or conditions enumerated in a preceding chapter, as "writes *upon paper*, *with* a pen, *for* the press," etc.

(5). Conjunctions which show the relation between parts and wholes, which they do or do not make. If a conjunction be copulative, illative, etc., the parts are declared to make the whole. If disjunctive, exceptive, etc., they are declared not to be united in fact, so as to make a whole, although such a union is conceivable, and may be made a matter of question.

271. I take no note here of "participles" since for all present purposes they are the same as mere adjectives. To speak of them as participles is merely to show their etymological relation to verbs.

272. I take no note of "pronouns" because they are either nouns or adjectives—that is, personal or relative pronouns which are used instead of nouns themselves, —or adjective pronouns in which case their functions need not be considered separate from that of adjectives or articles.

273. Articles I have not included among the distinct parts of speech, since some languages have none. But in fact they are necessary for any well-developed language, and perform a most important part in all cultivated languages with the exception of the Latin.

274. The use of the Article in English is very peculiar. In the Greek Language, and also in the French and German, it may be used with abstract nouns, even when not followed by any limiting word or clause, as "*the anatomy teaches,*" etc., "*the virtue gains confidence.*" But in English proper, the article "the" is never used before an abstract noun, except when it is followed by the preposition "of" or a clause beginning with a relative pronoun, as "the pain *which* we feel," etc.

275. This is a very important fact, for it follows from this peculiarity of our language that when we use the article "the" before an abstract noun not thus followed by a limiting clause, we immediately and instinctively *objectify* the abstraction and treat it as a concrete substance. Hence has come the belief that what we call "the faculties of the mind" are more substantial than the motions of the body, and we say "*the memory*" or "*the imagination*" does so and so. But we never say "*the walking*" or "*the sleeping*" does so; we say simply, "walking fatigues us," "sleep, or sleeping refreshes us."

276. It is manifest that words, in order to make a sentence that shall be intelligible, must be put together in accordance with the relations which the things denoted by the nouns in the sentence either (1) appear to sustain or (2) may be supposed to sustain to each other.

277. Now this is a law that lies below Grammar and Rhetoric; for a sentence may be so constructed that it will

fulfill every law of Grammar, and of Rhetoric too, which nevertheless has no meaning. I say *every* law of Rhetoric except that of *perspicuity*, and here Rhetoric is at fault; for it provides no rule whereby the sentence may be made perspicuous and no criterion by which we can tell why it is so. Campbell in his Rhetoric gives the following example; "All the voices of the celestial joyfulness, qualify, commix and harmonize in the fire which was from eternity in the good quality." No one, as the author remarks, can say that this is not true, for the simple reason that he does not know what it means. And it must be confessed that much of what has hitherto been considered Metaphysics, is of precisely this character.

278. With the description above given of the function of the adjunctive parts of speech, all that is required to make sentences intelligible is a compliance with these four rules.

RULE 1. In categorical propositions where the verb used is simply "is," or its plural "are," the predicate must be either,

- (a) a synonym of the subject.
- (b) an adjective denoting some quality that does or may be understood to belong to the subject as "snow is cold;" "paper is white," etc.
- (c) some common noun that denotes a class in which the subject is, or may be supposed to be contained. as "horses are quadrupeds;" "eagles are birds;" "whales are mammals."

279. If the adjective denotes a property that *does* belong to the noun, or a noun-predicate denotes a class that *does* include the subject, the proposition is both intelligible and true; if not, it is intelligible but false, as "snow is warm;" "horses are birds." And even the proposition

that is false when taken literally, may be true figuratively. Snow may be warm compared with something else; "horses" may be called "birds," in reference to their beauty of form, or their speed of motion.

RULE 2. If the verb be any other than the verb "to be," the grammatical nominative must be a concrete term to denote the agent that does, or may be conceived to perform, the action.

280. We are so much accustomed to the departure from this rule, by metonymy, that we shall hardly be prepared to admit it without some of the considerations that follow below. But of course we cannot conceive of any action without something that acts, and that something whatever it may be, will be denoted by a concrete term if denoted or spoken of at all; or rather whatever term is used to denote it becomes *de facto* concrete.

RULE 3. If the verb be transitive, denoting not only a state of action, but actual causation, either producing, perceiving, or changing something, the word which denotes the grammatical object must be a concrete term.

281. This also results from the nature of the act denoted; thus, "to eat" is a verb of this kind, and in order that the act may be performed there must be something that is eaten, and that thing must be a substantial reality, or the act cannot take place, or be conceived to take place.

282. Many verbs, however, are active *intransitive*, as "to walk," "to run," and they require no objective case after them. Many of them will take none, except as they are followed by a preposition between them and the noun, as "to walk *on* the floor, *with* a cane," etc. Many such words, however, will take after them an abstract noun denoting the action itself; thus we may say either "to strike the ground," denoting the object struck, or "to strike a

blow," the objective in this case denoting no object and is only a more emphatic way of stating the matter than the simple verb without the noun.

RULE 4. The fourth rule is, that conjunctions connecting words, must connect only those that are of the same quality; that is, if one be abstract, the others must be so, too; if one be concrete, the others must be concrete, also.

283. This is obvious from the definition of the function of conjunctions given above. We can conceive of any concrete objects being grouped together to make a collective whole; we can conceive of almost any properties being contained in the same object. But the man who should say that "water," for example, is composed of oxygen, hydrogen and *fluidity* would violate our rule and cause us to look up in astonishment, wondering what he could mean.

284. These rules apply to simple and compound sentences only. When a sentence is complex, or rather when it has a complex term, that is, a term that consists of more than one word, we must remember that,

(a) Adjectives limit the sentence so as to apply to either some species of the class, or some special state or mode of the individuals; and thus a proposition which would be doubtful or only partially true without the limitation, becomes true with it.

(b) The noun following a preposition, unless it be the preposition "*of*," must be concrete, if it is to denote anything that is to be considered as a cause, material, instrument, etc. Otherwise, the preposition and the abstract noun are virtually an adverb, as "with speed" is the same as "speedily," "in haste," "hastily," etc.

The preposition "*of*," however, stands between two nouns, rather than between a noun and a verb, and the

two nouns may be replaced by a single complex term, by making the one that follows the preposition an adjective qualifying the one before it, as "horses of wood," "wooden horses," "goddess born of the sea," "sea-born goddess," etc.

(c) An adverb limits the scope of the verb, as the adjective does that of the noun, and in fact may always be transferred to the subject of the proposition, and become an adjective, as "John walks with speed," "John (with speed, or speedy at the time), is walking." In this case, the adjective so obtained, can denote only an accidental property or mode of the subject.

285. Language used in accordance with the above rules and conditions may be considered *literal* or *didactic*, (all other is figurative or poetic), and if it describes things as they are, it is true, if not, it is intelligible, though untrue. But if used in violation of any one of these rules it becomes in itself unintelligible, and neither true nor false; and the only way to educe any meaning or make it intelligible is to treat the language as figurative, and substitute for it its logical equivalent. This may be done in one of two ways.

(1) When we have an abstract term, by way of *metonymy*, and a concrete term is demanded, we can always convert the term into its logical equivalent, by taking for the abstract noun its proper adjective, and placing after it any noun that that adjective may qualify; thus, "trade enriches men," "men *trading*, or by trading, enrich themselves." "Food satisfies *hunger*," "food satisfies *men hungry*," or "hungry men." In this case, we might as well say "animals," since "hunger" can be predicated of animals as well as of men." And it should be always borne in mind that it is safest to take the most general term that the adjective can be predicated

of; since whatever is true of the genus, is always true of the species, but not the converse.

In many cases, however, when the abstract noun follows the verb, it is best to consider it a part of the verb, or substitute another verb that expresses the same thing without requiring the aid of a noun, as "exhausts the strength;" this is equivalent to "enfeebles," but is more forcible rhetorically, and we might say, "medicine strength-exhausts," or "takes away strength."

We are, however, so much accustomed to these metonymies that we understand *those that all are accustomed to* without the process I have been speaking of; and in fact scarcely regard them as figurative expressions at all. But the moment we meet with a new and unfamiliar one, we pause, and often, after the best we can do, find ourselves at a loss to comprehend what the author intended to say. And in our effort to comprehend, we objectify abstractions, mythologize a meaning to the word, and imagine or fancy something corresponding to it.

(2) In case the expression is a metaphor or simile, it arises as we have seen, from a comparison, and is, for the most part, if not always, designed to describe an effect when the cause and the *modus operandi*, either or both of them are unknown. In this case, we are simply to return to the full statement of the comparative proposition in which the figure originated.

Thus, to take a familiar example, "light comes from the sun at the rate of twelve millions of miles per minute." This, of course, objectifies "light" and makes it a substantial thing that can "come" and "go," etc. But all that is really known, and all that can be held to be fairly proved by the observed phenomena in the case, is that the effect is the same as if "light" were a substance that moved from the sun to the earth in the time

or at the rate above specified ; or, in a more formal statement, "the effect (which is seen) is to the cause (whatever that may be) as a substance (heat) coming at the rate, etc., to the earth."

In this last case we get a result which is intelligible and true ; because it describes an observed fact, (the illumination of the earth,) with whatever of attendant circumstances had been noticed at the time. But it says nothing, for the observer knows nothing, of the nature of heat, whether it be a substance emanating, an undulation in an imponderable ether, or a mere "mode of molecular motion."

286. Under the former rule, the one in regard to metonymies, we get a proposition that is always intelligible, but not always true. The proposition will always have lost much if not all of its beauty and rhetorical force. Thus, if we transform "God is love," into "God is *loving*," we have all of the truth that there was in the exposita, but the force is gone. The proposition, however, often becomes absurd the moment we have substituted the logical equivalent for the abstract term. Thus a certain writer, in order to explain, and as a means of explaining the origin of material objects says, "suppose two simple activities meet, and at the place of meeting resist each other, they produce a third thing, etc." Now for "two simple activities" put, as by the rule "two simple *acting* bodies," "two simple bodies *in action*," and we have the manifest absurdity of attempting to account for the origin of the *first* body by supposing two *before* it to produce it.



## SECTION II.

## FALLACIES IN DICTION.

287. A Fallacy is any formula or other statement which has the appearance of an argument without the validity of one; and so we call both the fact by reason of which it lacks concluding force, and the formula itself, by the same name, a Fallacy, as when we say, "his whole argument is a fallacy," or when we speak of the fallacy of one's argument.

288. Fallacies are divided primarily into two classes, Logical Fallacies and Extra Logical Fallacies. Those are called Logical Fallacies which offend against any of the rules that are considered as coming properly within the province of Logic, and are sub-divided into two sub-classes, Fallacies *in form* and Fallacies *in diction*. The Extra Logical Fallacies are also sub-divided into two sub-classes, Fallacies in Matter or material Fallacies, and Fallacies in Method.

Hence, we have four species of Fallacies, Fallacies in Form, Fallacies in Diction, Fallacies in Matter, and Fallacies in Method.

289. A Fallacy is said to be in form when it is apparent from the form of the syllogism merely, without considering or knowing what is the meaning of the terms. Of this kind are most of those we have already spoken of, as Undistributed Middle, Illicit Process, etc.

290. A Fallacy is said to be in diction when the language used is such that it appears to express and represent the formula though it does not. Of these we have had no example discussed thus far. But I shall enumerate six in the following pages, namely: Figurative Lan-

guage, Many Assertions, Ambiguous Middle, Variation of Condition, Division and Composition, Substance and Accident.

291. A Fallacy is said to be in *matter* when one of the premises is untrue, and this may extend to either the premises that are asserted, or to those that are implied as in Enthymemes, etc. And of this kind there may be five, "Non vera pro vera, Non causa pro causa, Metabasis, No sequence, and Non-excluded Middle."

292. A Fallacy is said to be in *method* when the speaker or writer assumes what he ought to prove, or adduces arguments which are perfectly good, but do not prove what is required or what he claims for them as a Conclusion.

293. Most modern writers of note give no list, classification or account of the Fallacies, on account, perhaps, of the incompleteness of the list hitherto, and the want of clearness and satisfactoriness in the classifications that have been made. Perhaps an account of them is not necessary to the completeness of a treatise on Logic, but it would certainly be of great practical value, as all will confess, if a complete enumeration and a satisfactory classification and explanation of them could be given. We need not only to know the way to truth, but we are better prepared for its successful pursuit, when we have had the principal, if not all the sources of error pointed out to us. On a subsequent page, (§ 519, Note,) I have appended a classified list of the Fallacies.

294. I give in the first place, the list of Fallacies as they are presented in the Scholastic writers, taking the one I give from Aldrich. These writers speak of them as of two kinds, Fallacies *in dictione* and *extra dictionem*. And I give the list, not because I think it of much value, but, (for the reason I have very often introduced techni-

cal terms,) because they occur in writings where educated men will meet with them and feel the need of some explanation of their meaning.

295. *In dictione* are six. (1) *Equivocation*, (2) *Amphibolia*, (3) *Composition*, (4) *Division*, (5) *Accent*, (6) *Figure of Speech*.

The example of equivocation given as an illustration is, "the *dog* is an animal, *Sirius* (the dog star) is a *dog*," the equivocation being in the word "dog." *Amphibolia* consists in an uncertainty in the grammatical construction of a word, as for example, the antecedent of a pronoun or the subject of a verb. *Composition* and *Division* I shall explain more fully below. *Accent* is the misleading the mind of the hearer by placing the emphasis in a sentence upon the wrong word, as in the well-known example, "Do you ride to town to-day?" It may be made to have six meanings as we accent one or another of its words. *Figure of Speech* is rather form of expression, as when one infers from the form of the word "*musa*" which is feminine, that "*poeta*" is feminine also, because they both terminate in the letter "*a*."

296. *Extra dictionem* (1) *Accidents*, (2) *a Dicto secundum quid ad dictum simpliciter*, (3) *Ignoratio Elenchi*, (4) *A non causa pro causa*, of which there are two varieties, *a non vera causa* and *a non tali causa*, (5) *Consequences*, (6) *Petitio Principii*, (7) *Plurimum Interrogationum*.

297. *Accidents* and *Quid* I shall explain more fully below, as my sixth in diction. *Ignoratio Elenchi* and *Petitio Principii*, I shall also explain as *Fallacies in Method*. *A non causa* I shall explain as a *Fallacy in Method*; it is simply the assertion or the assumption of a premise, which, because it is not true, is not a *logical* cause of the conclusion. *A non tale* I shall treat as a

Fallacy in diction, and call it the Fallacy of Variation ; the Fallacy of Consequences is in fact, any Fallacy in Form. And Plurimum Interrogationum, I shall treat as the second Fallacy in diction, calling it rather the Fallacy of many Assertions, than the Fallacy of many questions.

298. Of the Fallacies in Form I shall say no more ; they have all been described in the foregoing pages when we were discussing the forms themselves. When they occur we have simply a *non sequitur* ; the Conclusion may be true as a *proposition*, but it does not follow from, and its truth is not proved by the Premises.

299. Fallacies in Diction I have defined in general. They are Fallacies in the statement of a syllogism whereby it appears to fulfill all the requirements of the formula and yet does not. In case of a Fallacy of this kind the conclusion may be said to follow *per fallaciam*, not truly or validly, but by a Fallacy,

300. We know or detect a Fallacy in Diction only by considering the meaning of the words used. And we find that one or more words in the syllogism must be taken in different senses or with different limitations in the different parts of the syllogism in order that the propositions whether Premise or Conclusion in which it occurs, may be assented to. Thus, if a man should say, "feathers are light," we should not think of disputing him. And if afterwards he should say, "light is necessary to color," we certainly should not dispute him. But if he go on and infer that therefore "feathers are necessary to color," we should hesitate, and on looking back we might find that his Syllogism was faultless in form, each Premise true, but in order that the Premises may be assented to as true it is necessary to understand the word "light" to mean different things in each.

301. Hence, I draw two practical inferences of great value.

(1). A Fallacy in Diction is more likely to occur where one person is reasoning by supplying one Premise of his own, from a Premise laid down by another person, than if he were stating both Premises himself and as his own. Hence most of these Fallacies occur when but one Premise is prominently stated.

(2). No one can safely use as a Premise any proposition that he does not comprehend, and of course any one must be able to explain the inference or conclusion he draws, otherwise he has no security, and we have no guarantee against a Fallacy in Diction. In every science there are technical terms that have meanings peculiar to their use in that science, to such an extent that if one uses them who does not know their scientific meaning, he is pretty sure to make false applications of them, or what is the same thing and leads to the same result, makes false deductions from propositions in which they occur when used by him as Premises.

302. (1). Of the Fallacies in Diction the first that I mention is the Fallacy of *Figurative Speech*. This is in fact like the old *Figura Dictionis*, and yet it is not the same. What I mean by it is the Fallacy of taking what is figurative in one Premise as though it were literal in the other. Thus we very commonly say "light comes from the sun." But whatever *comes* must be a substantial reality capable of separate existence. This latter is but the common sense of mankind and is in accordance with the strictest analysis of the word "comes." Hence, most people believe from such expressions that light, heat, etc., are substantial.

303. I have said that every figurative expression is a *suggestio falsi*, suggests something false and it is the

province or function of the Fallacy I am now speaking of to bring out this that is false, and to hold or affirm it as an inference from the figurative expression.

304. (2). Many Assertions; the ancients call this a Fallacy of Many Questions. The example they gave was something like this: "Have you left off tippling?" If the respondent answered in the affirmative he admitted thereby that he had been in the habit of tippling or drinking to excess. But if he should answer in the negative he would admit that he still continued the habit. But if we put the same thing into the form of an assertion, we have a double assertion. "Such a one has left off the habit of drinking," asserts the two facts that he once had the habit and that he now has it not.

305. When St. Paul says, "after the manner which *they call* heresy, so worship I the God of my fathers," we can readily imagine some one had said, "he has joined the Christian heresy." Now suppose for the sake of the truth that was in the assertion "he has joined the Christians," St. Paul had allowed the statement to pass, and some one had quoted it for the other assertion, "Christianity is a heresy," and used St. Paul as an authority to prove the assertion, we should have the Fallacy of Many Assertions.

306. In fact, there is scarcely a proposition possible that does not make or imply two assertions. If I say, "This is a pen," I assert (1) that it is—that it exists as something, and (2) that it is a pen, either of which may be untrue. I may be mistaken, and suppose there is something when there is not, or I may suppose it to be a pen when it is something else.

307. The Fallacy under discussion, therefore, can occur when, of the two propositions implied, one is true, and the other is false; so that what is false will be admitted

for the sake of the one that is true, and then the proposition will be reasoned from for the sake of the one that is false.

308. (3). *Ambiguous Middle* as it is usually called, or, as it is better understood, ambiguous terms.

Any term is said to be ambiguous, when it is used to denote two or more different things, or in two or more different senses. And there is scarcely a word that is not so used; as any one can see by turning to his dictionary.

309. When words are so used, they are, for all the purposes of Logic, the same as two words, and if the thought were so expressed, we should have at once and obviously the Fallacy in form of "Many Terms."

As an example the one already used is as good as any that occurs to me.

Light comes from the sun.

Feathers are light,

*Therefore*, Feathers come from the sun.

310. No one would assent to both the Major and Minor Premises, if he were required to understand the word "light" in the same sense in both. But accepting it in different senses we can assent to both of them as true, and yet the inference or conclusion is false.

311. (4). *Variation of Conditions*. This is substantially the same as the scholastic writers meant by *Non tale, pro tali*; that is, the object denoted by one of the terms, though the same in substance, is not such in its quantity, condition, etc., when spoken of in one Premise as it is when taken into the other.

312. Variations may be of three kinds at least: quantity, time and condition.

(1) In quantity, as in the following example:

Money will buy whatever is for sale.

A two-shilling piece is money.

*Therefore*, A two-shilling piece will buy whatever is for sale.

Here the fallacy is too obvious to need exposition.

(2). In time,

Whatever is in the zenith is always over head.

The sun is in the zenith.

*Therefore*, The sun is always over head.

This is faultless in form, but it implies a difference in the time contemplated.

(3). For a Variation of Condition, we have the following:

We eat what we buy in the market.

But we buy *raw* meat in the market,

*Therefore*, We eat *raw* meat.

Sometimes the act denoted by the verb itself makes a change in the condition of the subject. Thus, on the 14th of June Richard Roe married a wife; but on that day Rachel Roe was not a wife, therefore, Richard Roe did not marry Rachel Roe. But "he married a maid and she made him a wife."

313. (5) *Division and Composition*. This is the result of using a term as a collective term in one Premise, and then as a general term in the other, or, possibly in the conclusion. As an example:

The Romans conquered Carthage.

Cicero was a Roman.

*Therefore*, Cicero conquered Carthage.

Here it is manifest that we must understand the Romans collectively in the Major Premise, while, of course, it is used as a general term in the Minor. Otherwise the Premises would not be assented to as true.

314. This form of the fallacy is called *Division*, because



we use the Middle term first as a collective term, and then as a general term. But in case we use the Middle term first as a general term or distributively, and afterwards as a collective term, or collectively, the Fallacy is said to be one of *Composition*. Thus:

Three and five are two numbers.

Eight is three and five.

*Therefore.* Eight is two numbers.

Or again:

“The miracles of Christ would fill more books than the world could contain.

But the things related by the Evangelists are miracles of Christ.

*Therefore,* The things related by the Evangelists fill more books than the world could contain.”

Here “The miracles of Christ” must be taken collectively in the Major Premise, else the proposition would not be assented to as true. But in the Minor Premise the term is used as general, being made the predicate of an affirmative proposition. Hence the fallacy of Division.

315. The difference between general and collective terms has already been somewhat discussed; but it may be well to recall it.

Whatever may be predicated of a general term may be predicated, and is in fact predicated distributively, that is of each individual contained in the class. And conversely, whatever may be predicated of all the individuals of any class, may be predicated of the class as a common property. But in regard to collective wholes neither of these propositions are true. Take, for example, a family, we may say “it is a divine institution, it is the union of parents, children, etc.” But we could not say either of these things of any single member of the family. Again we may say of each member that he is a “biped,” and a

“vertebrate mammal,” etc., neither of which could be said of the family.

316. We have some terms that are always collective, as church, army, congress, etc. But any general term may be used collectively, when used as the subject of a proposition. And our only criterion by which to determine the question whether a term be so used or not, is to consider from the nature of what is predicated of the subject whether it can be affirmed of the individuals comprising the class separately and individually or not. Thus in the example given, “the Romans conquered Carthage,” the act is one that requires their combined activity. No one of them did it alone. Hence the word is used collectively. But in another example “the Romans spoke the Latin language,” we see that the word must be understood as used generally, since the act ascribed to them is an individual act; each one of them must have done it for himself.

317. (6) The last class of Fallacies in Diction are the Fallacies of *Substance* and *Accident*.

Whatever exists at all, must exist (1) *as a substance*, with certain essential properties that can never be destroyed without destroying its individuality and making it to be something else, called by a different name and belonging to a different species. And (2) it must exist *in some particular mode*, at some particular time or place; that is in some congeries of accidental properties, or circumstances which not only can be changed, but which are constantly and continually changing.

318. Some nouns denote substances in their simplest mode or form, or rather regardless of mode or form, as “iron,” “air,” etc., etc., but others denote them as in some particular mode or form, as “wind,” which is “air in motion.” Or again we may have “water” as the sub-

stantial thing and then have "sea," "river," "lake," "rain," "fog," etc., etc., as modes of water.

319. Hence all nouns, except these substantive nouns, are equivalent to a noun and an adjective, as "wind," "air *in motion*," "river," *running water*." And even "water" might be regarded as "oxygen and hydrogen *in a certain state of combination*."

320. A noun always denotes its object by all the properties that are essential to the object. There are, however, certain properties which, although in reference to the object they are quite accidental, do become, nevertheless, quite essential to the proposition in which the word occurs. With these it will be understood, accepted and assented to as true, while without such limitations, it would be likely to be misunderstood, and pretty sure to be contradicted and rejected altogether.

321. But a modification or modal which is essential to one proposition, becomes useless or mischievous when the same subject is used in another proposition, and with a different predicate; and *vice versa*, that which is accidental in one, will be regarded as essential in another.

322. Hence, when a modification or modal is introduced into a Premise which is accidental there, and so brought into the conclusion as to be regarded as essential, we have that variety of the Fallacy under consideration which is called *Fallacia Accidentis*, or fallacy of accidents.

323. But on the other hand, if we make what was essential in the premise, accidental in the conclusion, or treat it as such, we have the other form of this fallacy, as it has been called, *A dicto secundum quid ad dictum simpliciter*, or simply, and for brevety's sake, we may call it the fallacy of *Quid*.

Thus, if I should say that Mr. Jones is a good shoe-

maker, I imply that he is a man, for he must be that to be a shoemaker; that is, shoemaker is a shoemaking man. If now, using this as a premise, I infer and assert that he is a "good man," I have treated the adjective, "shoemaking," which was what I had chiefly in mind, when I asserted or assented to the premise, as accidental. If now I drop it out of the conclusion, and make the other adjective, "good," qualify the substance "man," rather than "shoemaking," as it had before done, we have one form of Fallacy under consideration.

324. This fallacy is very likely to occur in the use of adjectives which may be understood to qualify either the substantial thing or the mode implied in the word used to denote it. Thus, if I speak of a man as "my old friend," it may be a matter of doubt whether I mean to imply that the *man* is old, or only that the *friendship* is old, though the man may be young. If, however, the adjective is understood by the person that utters it to qualify one, and is taken by him who heard it to qualify the other, we have one or the other of the forms of the fallacy of Substance and Accidents, as the case may happen to be.

325. This fallacy is especially likely to occur in reasoning from comparisons; since comparisons are always made *secundum quid*, with reference to some one point of resemblance or analogy, and the moment we begin to extend one beyond that point, we begin to take it as *dictum simpliciter*, as if the resemblance extended to other points than the one intended, or possibly as constituting complete identity. Thus, I not long since heard a clergyman arguing from the declaration, "That same Jesus shall so come in like manner as ye have seen him go into Heaven," that Christ would come again in *visible form* to abide on earth. I could not help raising the

question whether he was not mistaking the point of resemblance intended, and committing the fallacy of quid. In the following example the fallacy is manifest. Nebuchadnezzar ate grass like an ox, the ox eats grass standing on all fours, with horns and hoofs, therefore Nebuchadnezzar must have had horns and hoofs during his estrangement.

326. This Fallacy, *fallacia accidentis*, often occurs in those mental processes that precede the utterance of a Proposition and when, of course, no Premises are given on account of which we can regard it as a conclusion. Thus a few years ago a friend happened in town where there had been a religious service on a day in the week, Friday. He remarked on the fact, "I see you have prayers on Fridays." It was true in fact, but we had had the service not because it was Friday, the Fridayness, if I may use such an expression, being purely accidental. The essential thing was that it was St. Peter's day. It was St. Peter's day essentially and Friday by accident *that year*. Again four or five of the first Presidents of the United States went out of office at the age of sixty-six. And yet they did not go out of office *because* they were sixty-six years old; it was because their term of office, four years, had expired. But, if, in view of these facts, one should say that "the Presidents go out of office at the age of sixty-six," he would be committing the Fallacy of Accidents, even though he should not state the Premise from which the inference was made.

327. If then, into any proposition, we introduce an adjective when it is not necessary as a limitation to the scope of the proposition, the man who reasons from it as though the adjective were necessary, commits the Fallacy of Accidents; and if we omit an adjective when it was necessary as a limitation, the man who reasons from the

proposition as though no such limitation had been necessary, will commit the Fallacy of Quid—or Substance.

328. I think the foregoing will be found to be a complete list and account of the Fallacies in Diction. It will often happen, however, that one will be in doubt to which class to refer what is obviously a Fallacy in Diction of some kind. In a general sense they may all be said to be Fallacies of Ambiguous Middle, since in them all, the middle term is used in a different sense in the two Premises. Yet strictly, it is not ambiguity in all the cases; since ambiguity consists in denoting one thing in one Premise, and another thing in the other. But in the *Not tale* or variation, it is the same thing, differing only in quantity, time and place. In Division and Composition it is the same individuals considered in one Premise as a class or genus only, and in the other as a collective whole, and in the Fallacy of Substance and Accidents, it is the same thing that is denoted by the term in both propositions, but in one the statement is made in reference to its substance or essential properties only, and in the other in reference to something which if not accidental to the substance or thing itself, is at least accidental to the proposition that is affirmed.

329. However, it is sufficient for all the purposes of criticism, to refer them to any one of the classes, since they are each of them, and all alike fatal to the reasoning. The only object of the classification at all, is to show the precise nature of the Fallacy, and to assist in making it manifest as such; the calling it by a name will have no effect, except as the name is understood to indicate the nature of the fault, and this it can do only when properly applied and when used in the presence of those who understand it.

## CHAPTER II.

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### THE LOGIC OF PROOF.

330. There is one important sense in which all reasoning may be considered as belonging to two classes, or of two kinds, *Mathematical* and *Logical*, (although logical reasoning in the broadest sense in which the term is used, includes mathematical). A third kind is sometimes spoken of, as *Moral* reasoning, which however, is not so much *reasoning*, in any proper sense of the word, as *persuasion*. It consists rather, of an appeal to the Conscience and Moral Feelings of man, than in any effort to convince him of a truth. When men speak, as they sometimes do, of historical reasoning, etc., they mean logical reasoning concerning historical facts.

331. In the Physical Sciences the principal inquiries are after laws and causes. Hence Induction and Elimination are the two principal processes, the parts of Logic most in use, and these are processes in which Fallacies in Form or in Diction are not likely to occur; and in which moreover, no *general* rules and principles can be of much use; such rules and principles, so far as these Sciences are concerned, are intuitive and self evident; the great difficulty is in the exercise of insight, in discriminating the essential, from the really accidental properties of objects, and in discerning between *real*

causes and mere attending circumstances and unimportant conditions. And in this, no general rules or formulæ can be of much use. The seeing of the eye must precede the use of optical instruments, and without that, they are of no use.

332. In mathematical reasoning we deal with *units*, or objects, considered merely as existing or possible and being therefore *numbers*. When several of them are combined, they are considered as making up geometrical objects, having *size* and *form* also, as the line, the surface, the solid, etc. In this kind of reasoning, the reasoning cannot be based upon the nature or properties of its objects—units having no properties—and the chief importance of the discussion attaches to the process or formula of reasoning, as addition, subtraction, involution, evolution, transposition, transformation, etc. Fallacies in Form or in Diction can scarcely occur; and in fact they never occur except when the mathematician attempts to pass from the domain of mathematics to ontology, and speaks of the *nature* and *reality* of the things denoted by his symbols, as for example, “*zero*,” “*infinite*,” etc. Hence no one doubts the utility and necessity of Mathematics. At every stage, it is explaining to him steps and processes that he knew not before, and enabling him to do things of the greatest importance that he could not do before, and could never have done without the knowledge thus gained. Nobody doubts the utility of Mathematics.

333. In logical reasoning, on the other hand, we deal with *individuals*, and not mere units, with objects having properties and having therefore an individuality, or identity, resemblances, analogies, contrarieties, etc., and on these properties the reasoning is based. In this kind of reasoning, the formulæ and processes are important indeed, but yet they are very subordinate in importance to



the primary acts of insight and sagacity on which the reasoning depends and which all reasoning presupposes. In Logic we find indeed, a scientific explanation and vindication of what we have been accustomed to do and what we can do without a knowledge of theoretical Logic, and moreover, we find an explanation of, and a warning against the possible dangers and fallacies; but we do not learn to do any one thing that we could not do, and had not been accustomed to do, after a fashion, before we had taken the trouble to study the science of reasoning. We learn only to do the things more intelligently and with greater security against error. But after all that our study of the science can do for us, the great practical difficulty remains and recurs on every occasion in which we are called upon to exercise our reasoning faculties, the difficulty and necessity of discriminating and discussing the nature of the objects about which we are to reason and the method of reasoning applicable to the case. Hence many doubt the use and necessity of Logic as a science.

334. Again: in the application of Mathematics we are forced at every step to recall our rules and formulæ, to think of them, and thus we retain them in mind and are constantly impressed with their importance, an importance which constitutes an indispensable necessity for them. No man, for example, can make a simple calculation, compute the smallest sum in his business transactions, without recalling his multiplication table, and remembering that three times three are nine, three times four are twelve, etc. Hence all believe that the Multiplication table is a good thing, and that Mathematics is a practical thing, and necessary as a part of one's education. As already said, in Mathematics, although the reasoning can be stated in, or reduced to, some one of

the Formulæ given above, there is little or no danger of Fallacies either in Form or in Diction. This is owing entirely to the nature of the subject matter of the reasoning. And as a general rule there is no class of persons who are less likely to think well of, and appreciate the Science of Logic as a *science of reasoning* than mere Mathematicians.

335. In logical reasoning, on the other hand, one is constantly drawing inferences and conclusions without remembering, or even having ever distinctly considered that a term that may be predicated of a class, may be predicated of each individual in the class; or that the predicates of any subject may be predicated partially of each other. Hence people are constantly making mistakes in their reasoning, without knowing or suspecting it; and they attribute the differences in opinion which are the consequences of such mistakes, to any thing but the right cause. They do not see the use of Logic; have never studied it, or derived any benefit from the study (that they are aware of) if they have, and as they get along well enough, in their own estimation, without such a study, they regard it as useless.

336. So they say; and yet there is not one of them, nor a sincere and earnest student, or practitioner in any department of knowledge, who does not feel and express often, in diverse ways, the need for a fuller exposition and a better understand of the principles of what is really Logic, *as applied to his special department*. These men, however, seldom call that which they want, Logic. The mathematician, is of course, profoundly impressed with the importance of his science, and yet Mathematics itself, that is *pure* Mathematics is nothing but logic—the logic of number and form. The great popularity and the high estimate placed on MILL's Trea-

tise of Logic, have not been to any extent the result of its completeness as an exposition of all that is included in the term Logic, but rather for the care and attention which was given in developing the Logic of the methods of scientific investigation in the domain of physical Science. And in all the modern efforts in Metaphysics and Theology, the discussion of questions of what is purely Logic applied to their several subject matters, forms a large and conspicuous element, not to say the chief or only one of importance. And any book in whatever department of knowledge, that rises to the dignity of a scientific treatise at all, is, and of necessity must be, largely occupied with the logic or principles, methods and formulæ of reasoning, applicable to the subject matter treated of and the ends aimed at in the undertaking.

337. If however, we consider the Logic of Proof or applied Logic *in its most general principles* it runs so nearly into Rhetoric that it is difficult to preserve the just boundary between them. I think, however, that WHATELY'S distinction,\* for which, however, he cites CICERO as authority, is the just and proper one; "the business of Logic is to judge of the force of arguments; that of Rhetoric is to find and use them." In Rhetoric we aim at conviction, *in order that we may persuade*, and sometimes it will happen that the author aims to persuade without caring whether he convinces or not. Hence he must always take into account the *feelings* of his audience, both towards himself and his subject. He must also consider their intellectual state, not only in reference to the amount of intelligence they possess and the knowledge they may happen to have of the subject

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\* Rhetoric, Part I, Chapter II, § I.

he proposes to discuss, but also and chiefly with reference to any prepossessions they may have in its favor, or any prejudices they may be laboring under against it.

338. But in Logic we take no notice of such things; we look only at the nature and intrinsic force of the arguments. And for an ultimate result, that is all that requires to be considered; for mere states of feeling, prepossessions and prejudices will soon pass away; while the substantial force of an argument will remain the same forever. And of course, it is that, that will finally prevail.

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## SECTION I.

### THE CERTAINTY OF PROPOSITIONS.

339. We shall have occasion to use several terms, as "presumption," "probability," "certainty," etc. It may be well to say a few more words about them before proceeding any farther.

340. "A Presumption," as has been explained is merely such a preoccupation of the minds of those addressed in favor of any proposition as to make it necessary to assume the burden of proving the contrary. This is generally best done by the three steps, one or all of them as the occasion may require.

(1). Show how the error came to be believed or accepted as truth.

(2). Adduce probable arguments, that is, *facts* that will account for that being true which we wish to prove to be true. (§ 202.)

(3). Positive arguments—facts that show that it is true. (§ 203.)

341. "A Probability" is merely the capability of being proved. We show this in the lowest degree whenever, and by whatever means we show that the proposition is not absurd or self-contradictory. But also, and far better, and in a higher degree, when we show by reasoning from cause to effect, *a priori* in the *physical* sense, that there is some reason for believing it, some adequate cause for its being true, and thus create a presumption in its favor.

342. When we establish "a high degree of probability," as it is called, or show that there is a balance of probabilities in favor of any proposition, we create what is called a "*moral* certainty." It is called a "*moral* certainty," because of the ethical doctrine that in all cases where such a probability is all that we can have, and important consequences depend upon our acting upon the proposition as true, it is the duty of man so to act. What seems most probable is regarded as obligatory in such cases. Hence the term "*moral* certainty."

343. Again when we have established a *general* law or truth, by any of the processes of Observation, Average or Induction, we have for it what is called a physical certainty. In reference to future events it is only a very high degree of moral certainty. Since whatever is to occur, is pretty sure to occur in accordance with the general laws and uniform rules of nature and experience. If, however, the event be in the past, this form of certainty comes to be what we call *historic* certainty, and of course, may be of all degrees, from the merest presumption up towards that absolute certainty that can come from demonstration alone.

344. And then finally we have what is called *absolute* certainty. This, in its strictest sense, can come from demonstration alone. No mere observation or testimony

can produce it; since after all there will be the possibility of (1) false perception in consequence of some abnormal condition or exercise of the organs of sense and perception, and (2) mistaking the results of imagination for those of perception—a mistake, which as psychology teaches, is more frequently made than is generally supposed.

345. But in the case of *absolute* certainty, there can be no exception, and the proposition must be true in all places, and at all times, and under all circumstances.

346. The conflict of *facts* or alleged facts with such propositions, or rather propositions for which such a certainty is claimed, is always a serious one. It becomes diamond cut diamond. Of course, if the alleged fact *be a fact*, it will refute the demonstration, and show either that (1) the process has been faulty, or (2) and what is more likely, that one or the other of the Premises with which we started was untrue.

347. The grounds of certainty are commonly regarded as three. (1) Sufficient Cause, (2) Excluded Middle, (3) Identity and Contradiction.

348. Sufficient Cause is in fact anything that produces a feeling of certainty with regard to the conclusion, and that certainty *may* be either moral, physical or absolute certainty; although, for the most part, we speak of that which produces the two former only as a sufficient cause.

349. But in the last analysis sufficient cause is found to consist in one or the other of two things: Observation or Testimony.

350. The grounds of probability are numerous. In a strict and technical sense, any proposition is probable which is susceptible of proof; that is, any proposition that may be true under any circumstances and at any time or place. It is more common, however, to speak of

such propositions as *possible* rather than probable. But in this sense, any proposition does not involve a contradiction in terms is in itself probable, however unlikely to be true.

351. Or, again, any proposition is to be regarded as probable, in the sense of being more likely to be true than otherwise, which is generally accepted as true, or which has been held by the persons most likely to be informed on the subject.

I shall, however, treat of the arguments and means by which a proposition may be made or shown to be probable in a separate section below, Section VII of this Chapter.

352. The principle of *Excluded Middle* has already been explained (§ 246). On it rests the criticism of all of what is called indirect reasoning or proof; and the relations of Propositions one to another as coming under this rule have been explained (§ 90). If there is really *Excluded Middle* between contradictories, when one is proved to be true the other is proved by that process and on the principle of *Excluded Middle* to be false. We may, however, just as well extend the application of this principle to all cases of immediate inference coming under the rules laid down in § 90, etc.

353. Strictly speaking, there can be *Excluded Middle* only when there are but two propositions, and they must be so related that the subject will be the same in both—the one universal and the other partial—and the predicate of the one will be a positive term, and that of the other the same term used negatively. As All S are P, Some S are non-P, or No S are P, (All S are non-P), Some S are P.

354. But the principle extends to the relation of three or more propositions, as well as to that between two only,

when the co-ordinate terms are really co-ordinate parts of any whole (§ 243-247). Thus let  $n$  denote any individual in a genus, and the genus be  $X$ , and divided into co-ordinate species  $A, B, C, D$ . We can, of course, represent these as two,  $A$  denoting one and non- $A$  the other, and non- $A$  will be equivalent to  $B, C$  and  $D$ ; Or, if we use  $B$ , then non- $B$  will be  $A, C$  and  $D$ .

355. Thus the principle of Excluded Middle extends to any Disjunctive Proposition, however numerous its parts may be, provided the co-ordinate terms denote co-ordinate species and *enumerate them all*. This last is, of course, an essential condition; otherwise, the individual  $n$  may be in the species not enumerated or mentioned.

356. The Principle of Identity and Contradiction is usually spoken of as one principle. The principle when stated explicitly is as follows: (1) Any proposition that is *absolutely* true can be reduced to a form in which the subject and predicate will be the same as  $S$  is  $S$ . (2) Any proposition that is false *absolutely* can be reduced to a form in which the subject and predicate will be some one word as the subject, and the same term in its negative form as predicate, as  $S$  is non- $S$ , or  $S$  is not  $S$ .

The method of reducing propositions to these forms I shall discuss in the next Section.

357. Indirect proof or disproof consists in establishing a proposition by showing that its contradictory is an absurdity, or, at least, leads to a conclusion that is manifestly false. This, however, it never does, of course, except by means of other propositions used as Premises. It is necessary, therefore, that the Premises introduced for this purpose be themselves indisputably true. If, then, we take the Conclusion we wish to refute as a Premise, and by means of another Premise which is in-



disputably true, we derive from the two a Conclusion that is clearly false, we shall have shown that the Conclusion in question which we had used as a Premise was false, by what is sometimes called the *argumentum ab absurdo*.

358. This method is well known, and familiar to all persons as the "indirect method" of proof in mathematics. It is, in the common use of language, what is often spoken of as "showing that one's argument proves too much." If this kind of refutation be made by demonstration it will show that the proposition is *wholly* untrue—not true in any case. But if it be made by the ordinary course of induction of examples it will most likely only prove that it is not wholly true,—not true as a Universal, or even as a General proposition, but true at most, if at all, only as a Partial Proposition.

359. The reasoner, therefore, by whatever method he reasons, always begins with observation, the observed fact is evolved by the process already explained, into a proposition which becomes a minor premise, and thought and reflection furnish a self-evident axiom, a matter of immediate insight, for a Major Premise.

360. These Premises will, of course, always be two in number. And for the first syllogism in any course of argumentation, the major premise, will be an axiom, and the minor premise, either an obvious fact or a definition. And for the next in the course or series, the Conclusion of the first syllogism becomes a Premise, and then conclusions from preceding syllogisms become premises to succeeding ones, just as in geometry each proposition becomes a means, as a premise, of proving succeeding ones.

361. An Axiom is always an analytical proposition. It is *a priori* and *self-evident*, that is, its truth is seen and

assented to by all, as soon as the meaning of the terms is perceived. It can, of course, be tested—but hardly *proved* in the ordinary sense of that word—by the principles of identity and contradiction already explained. If it be true—if it be an axiom at all—its terms can be made identical, as S is S.

362. A Maxim, on the other hand, is a general truth obtained from observation, induction and generalization. It is, therefore, only a *general* truth—most general, as the word maxim means. Hence, it may admit of exceptions. It may have been hastily adopted, and, of course, what is accepted as a maxim in one age or stage of science may come to be regarded as untrue in another.

363. Strictly speaking, therefore, though I have spoken of maxims as primary Major Premises, they are rather later or more remote deductions by the inductive process, which as we shall see, (§ 441), begins with an axiom, namely, that which is true of some individuals of a class, founded on their *essential* nature, must be true of all the individuals of that class, that is of all that are not exceptions and monstrosities.

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## SECTION II.

### REDUCTION TO IDENTITY AND CONTRADICTION.

364. I have already defined the principle of Identity and Contradiction. But the process of reducing propositions to these forms requires a separate consideration.

These processes are of two kinds, the one mathematical and the other logical, or perhaps we had better call it verbal.

365. We shall best illustrate the mathematical method by taking a case in which numbers only are used. Thus, suppose we have  $3=2+1$ ; it is manifest that 3 may be written  $1+1+1$ , and 2 may be written  $1+1$ . Hence,  $3=2+1$ , may be written  $1+1+1=1+1+1$ , in which both members of the equation are, of course, identical, and the original proposition is shown to be true.

By substitutions, as under the above law or rule, any proposition in necessary matter that is not true, may be so stated as to assume the form  $S$  is not  $S$ , which, of course, is absurd. Thus, if we say 3 is equal to  $4+1$ , or 3 equals  $4+1$ . Writing as before, we have for 3,  $1+1+1$ ; for 4,  $1+1+1+1$ . Then, our equation becomes  $1+1+1=1+1+1+1+1$ , but this is the same as  $3=5$ , or 3 is 5. But 5 is (not 3), therefore, if the first proposition is true, 3 is (not 3).

366. In the first case, we reduce the *Exposita*, or proposition in its first form, to the form of identity—the subject and predicate being the same, and in the next we reduce to the form in which the one is not itself, either three is not three or five is not five.

367. The process thus far implies only (1) that we may substitute for any term its numerical or grammatical equivalent, and (2) the certainty of the arithmetical and algebraic changes we make in the course of the transformation. It is the business of Arithmetic and Algebra to teach us what these changes are, and how and to what extent they may be made without involving error in the result. And of course, any one of these processes must be made self-evident in the instructions given in those branches of science. They may also be tested, each one of them, by the principle of Identity and Contradiction now under consideration. This, however, is not usually done. Nor is it often necessary. All that is

required, or that is usually done, is to carry the demonstration so far that the pupil can see the result to which the process would bring him if it were carried to its extreme limit.

368. And there is not a proposition in the whole range of mathematics that may not be tested by this kind of reduction.

369. In the second place the reduction may be verbal also. It may be mathematical when we are dealing with numbers only, whether with what is sometimes called concrete numbers as in Arithmetic, or the symbols of numbers as in Algebra. But in all other cases it must be verbal.

370. As an example of this kind of reduction, not however fully drawn out in form, but fully implied, take St. Paul's argument concerning salvation by faith. "Even so then at this present time also there is a remnant according to the election of grace. And if by grace then it is no more of work, otherwise grace is no more grace. But if it is to be of works, then it is no more grace, otherwise work is no more work." That is, whatever is a gift is not a reward, for gifts and rewards differ in their nature, the one being a recompense for services rendered, the other a gratuity when there has been no service to reward. Hence, the so-called "gift" or "grace" which is a reward for good works, is a reward, not a "gift" or given at all; that is, on the supposition of the adversary whom St. Paul is confuting, grace is not grace or reward is not reward.

371. In the application of this test we regard the nouns of a proposition as denoting things that are spoken of; and all the other words that are used, of whatever part of speech, as the indications of the relations that we wish to affirm to exist between the things denoted by the nouns in the proposition.

372. In this respect the nouns are like the letters in an Algebraic Equation and the other parts of speech are like the signs, plus, minus, etc., etc. And as in Algebra we may change the equation by transposing terms from one member to another, by performing the operations indicated by the signs, so in Logic we can always make certain changes in a proposition so as to get either of the nouns in it to be the subject of a proposition and all the rest of the words to be its predicate.

373. In this process of verbal reduction there are several changes that may be made, all, or nearly all, of which are self-evident. And yet, care should be taken in making them or some error will be committed.

(1). In the first place we must remember that the conversion of propositions already described (§ 95), may, of course, be made.

By this means we can always make any noun that we may wish to have so, either the subject of a proposition or a part of it.

(2). Any adjective or adjective phrase used as a modal to a noun, may be made the predicate of a *partial* proposition in which the noun will be subject, as "white men," "some men are white."

This follows from the fact that the adjective is the differentia of a species and may therefore, of course, be predicated of part of the class denoted by the noun considered as a genus.

(3). The predicate of any proposition may be made an adjective and qualify the subject, and thus the proposition will be reduced to a complex term, as "men are bipeds," "biped men," "men are mortal," "mortal men."

This results from the fact that the predicate must be either an adjective denoting a property of the subject or a common noun denoting a class in which it is contain-

ed. But as a common noun it denotes the properties that are common to the individuals included in the class denoted by the subject and therefore it may be made an adjective qualifying it, as in the example above given "biped men."

(4). Any active verb may always be resolved into the verb "is" and a participle, which may be treated as an adjective, and will thus become a part of the predicate, if not the entire predicate, as "God exists," "God is existing," "John loves," "John is loving," etc.

We should be careful, in thus reducing propositions, not to commit an illicit process of the Major by making the predicate distributed, thus if we have "men walk on two feet," we may have "men are two-feet-walking." But if we should say "men are those that walk on two feet," we should make the predicate exclusive and the proposition a definition when probably it was not so intended.

(5). A transitive verb with its adjective may always be stated as a passive verb, and *vice versa*, a passive verb may be made into a transitive verb, as "John strikes Peter," "Peter is struck by John," or we may omit the modal and say simply "Peter is struck."

When we have merely the passive verb and its nominative we are obliged to use an indefinite term for the subject, as "John is loved," "*somebody* loves John," "the chair is moved," therefore "*something* moves the chair."

(6). Adverbs may be either resolved into adjectives, or as adverbs, made to qualify an adjective that limits the subject, "the river runs rapidly," "the river is rapidly running," or "is rapid while running."

Adverbs never qualify the neuter verb "is." They are used to limit the mode of a thing which is expressed or indicated by the verb, but the verb "is" indicates only substantial existence or being and not any mode at all.

Or again, adverbs, as grammarians call them, qualify adjectives, as "deep blue," "when walking," etc., but in either case they can be detached from the word and connected with the noun itself or with its adjective and thus with the noun indirectly, as one word, as deep-blue.

(7). An adjective or relative clause may always be transferred from the subject to its predicate by introducing an adverb limiting it to time or place, as "drowning men catch at straws," "men catch at straws *when* they are drowning," "the brook runs swiftly," "the brook is swift *where it is running*."

(8). Even a noun that is but a modal or part of the modal to a predicate may be made the subject of a proposition in which all the other words will be predicate, thus "John counted all the books that were lying on the table," we can make "table" subject and we have, "the table is that on which the books counted by John, were lying."

374. Then, besides these changes, we may make certain substitutions of words one for another.

(1). We may, of course, substitute for any pronoun etc., its grammatical antecedent, which is only its logical equivalent; and generally, we may always substitute grammatical equivalents one for another.

(2). In like manner we may substitute logical equivalents for each other. That is, for any term we may substitute its definition and *vice versa* its definition for any term, as for "triangle," "three sided figure," etc.

In like manner we may substitute for any term its verbal definition, as for "common salt," "chloride of sodium," etc., etc.

(3). For any distributed term, wherever it may occur, any lower term, or term denoted by any comprehended species or individual. (§ 122)

(4). For any undistributed term we may substitute any higher and more comprehensive term, which must therefore be used as an undistributed term. This law, also, has already been sufficiently discussed.

(5). The predicates of any term, provided they are connected by a copulative conjunction, may be predicated *partially* of each other.

This is, in fact, the principle on which all the syllogisms of the third Figure are based. (§ 107, 3)

The terms thus predicated will often be inconsistent and incapable of such a predication. Thus, a writer, whose book is before me, says: "God is one and many. He is time and space," etc. If so, then "one is many," and "many is [are] one." But, by substituting for the terms "one" and "many," their respective definitions, we find that one is not many, or if it is, then "one is not one" and "many are not many."

We might proceed in the same way with the other predicates "time and space," and show that if "time is space," "time is not time" or "space is not space." And in this way we can reduce any possible form in which pantheism can be stated, to a contradiction of terms.

(6). So, too, if any two predicates of the same subject are connected by a disjunctive conjunction, that which follows the conjunction may be denied of that which precedes it in a partial proposition, as "slaves are men but not citizens," therefore "some men are not citizens."

But if the disjunctive be a double one, no proposition can be made out of the predicates, for that would be an inference or conclusion from two negative premises, thus "A is neither B nor C," which is equivalent to A is not B and A is not C.

375. The processes thus enumerated and described are by no means all that may be performed. And it would



be a tedious and useless task, if not an impossible one, to describe them all. They must be either self evident or carefully considered and made evident as one goes along, precisely as we do in any mathematical demonstration. No proposition must be introduced which is not either (1) a self evident axiom, or (2) a conclusion proved by a preceding demonstration. So too, here, no change in the form of the expression, or in the order and position of the words, must be made without the utmost care and the closest insight, to guard against error.

376. In making these transpositions we shall often have occasion to introduce a term that was not in the proposition to be treated, in its original form. This, of course, we can have a right to do only as it comes under one or another of the foregoing rules; and thus we make a proposition which, although containing nothing that was not in the *exposita*, will nevertheless be different from it in matter; that is different from it in one of the terms, subject or predicate.

377. Of course, in doing this we shall often eliminate much of that which was in the proposition. So that if it comes to the form  $S$  is  $S$ , it affirms nothing that was not in the original proposition, though it does not affirm all that was in it. But if it comes to the form  $S$  is not  $S$  it shows that the original proposition contained or involved by necessary implication, the contradiction which is thus expressed.

378. We use the principle of Identity when we wish to make direct proof of any proposition by demonstration, and the principle of Contradiction when we want to disprove or refute any proposition, and by this refutation establish, by what is called the indirect method, its contradictory. Thus in the effort to prove that a straight line let fall from any point out of a given line

perpendicular to that line is the shortest distance between that point and the line, we begin by supposing some other line to be shorter than the given line and then proceed to show that the other (supposed) shorter line is not shorter nor even so short as itself.

379. This method of verbal demonstration may also be used with great advantage in metaphysics.

In case we have an abstract term where sense and the logic of language requires a concrete one (§ 278-283) we have of course a figurative where we ought to have a didactic proposition. Taken literally, it is unintelligible, and can be understood at all only by objectifying the mere properties and modes of things, thus making them as substantial as the things themselves. But when thus understood the propositions are untrue, and we have committed the fallacy of *Figura dictionis* the moment we proceed upon them as true.

380. If now, instead of this, we replace the abstract term by its logical equivalent found according to the rule laid down in (§ 285, 1) we shall have the true meaning of the passage. This substitution of the logical equivalent for the abstract term may indeed make the proposition senseless or even a contradiction in terms. But, if so, it is no worse than it was before.

381. Again, we may apply this method of verbal demonstration to propositions considered as expressing and representing facts or states of consciousness, and thus make it a means of developing and displaying all that is implied in them. Thus, suppose the question be as to the nature of the objects in the external world. Whether they are substantial realities, as most men believe, or the mere "shadows of ideas," as some philosophers have held, or mere "subjective, in the mind itself like the objects of a dream," as has been thought by others. We

have the proposition, "I see these objects," "I see this paper." But by Rule 3 (§ 280) the grammatical object of a transitive verb must be a concrete term; the word "paper" must, therefore, denote a substantial thing, and the paper itself is an objective substantial reality. If not, the word paper is abstract, and it does not denote a thing; it denotes no-thing—nothing. Hence we have, "I see nothing." But, "to see nothing," is "not to see," and the act of perception does not take place—perception is not perception. Hence it is as certain that the objects we see are substantial realities and external to ourselves as that the acts which we denote by the word perception ever take place.

In this way we may have a Transcendental Logic which, beginning with the facts of consciousness, will develop and demonstrate from them all that is implied in them, and thus give us, as I think, the principles and doctrines of Metaphysics—or, Ontology—in a form that will make them as intelligible as the facts of Natural Science and as certain as the truths of Mathematics.

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### SECTION III.

#### INDIVIDUAL PROPOSITIONS.

382. I have remarked that Logic is responsible for the *process* of reasoning alone, and not at all for the truth of any proposition that is introduced and used as a *Premise*. Hence, though the reasoning may be entirely and perfectly correct and faultless in all respects, the conclusion can have no more certainty than the Premises, and will in fact have only less than either of the Premises taken separately, if in fact both of them have any de-

gree of uncertainty; that is, unless one of them is an absolute truth, the nature of the uncertainty is precisely the same as that which we have considered and discussed in the case of Compound Conditionals. (§ 223.)

383. Hence, it becomes important to look into the methods by which the various kinds of propositions may be proved, and to consider the nature and extent of uncertainty, inseparable from each class of them respectively.

384. Any proposition that we may have occasion to prove, will be either (1) Individual, (2) Partial, (3) General or (4) Universal. An *individual* proposition affirms something, of one object only; a *general* proposition affirms its predicate of a class, with the possibility, if not the fact, of exceptions, and a *universal* proposition affirms its predicate with no possibility of exceptions.

385. Partial propositions are to be treated as virtually several individual propositions combined into one, without making a class, by giving their differentia; thus, if we speak of "some men," the "some men" may be Englishmen, they may be poets or anything else, but our proposition does not give them a specific name, it uses the general name "men" partially, and every man, every part of the genus not less than two nor more than all, minus one, may be included.

386. An individual proposition relates to an individual object; that object may be denoted by a proper noun, or by any common noun used in the singular number, with an article or demonstrative pronoun, pointing it out, as "the men," "this man."

387. An individual proposition may affirm the existence of the object simply, or its existence in some particular mode; thus, if I say "space exists," I affirm its substantial existence alone, or its existence *substantial-*

ter. But if I say "it surrounds all things," I affirm its existence in a particular mode, the mode of surrounding, etc. Hence, anything and everything that we can affirm of an object except existence alone, implies and affirms existence in some mode or "*modaliter*" as well as substantially.

388. An object can be known or proved to exist only as it is known or proved to exist in some particular mode; for any property or action we may ascribe to it, or that may be implied in the name, we denote it by, constitutes such a mode.

389. An individual proposition asserting either the existence of any object or any mode of it may be proved in either of three ways.

- (1). direct observation,
- (2). reasoning from effect to cause.
- (3). reasoning from cause to effect.

390. But a proposition asserting some property of an object without asserting or assuming, the reality or existence of the object, may be proved by demonstration from the nature of the object. Thus suppose I demonstrate the length of one side of a triangle from the length of the other two sides and their included angle. I make no use of the fact of the existence of such a triangle, I do not imply its existence. In fact, the triangle does not exist, and is no fact at all. Triangular objects may exist, but their existence or reality makes no part of the basis or ground on which the demonstration proceeds. And the conclusion is virtually no more than a hypothesis, so far as the reality of the object is concerned. It asserts the conditions under which the triangle or rather the triangular object, must exist, *if it exists at all*. But this method of proof gives us no means of demonstrating the existence of the object itself.

Hence we limit ourselves in this Section to a consideration of the three methods of proof already indicated.

391. We may know an object as either (1) an object, (2) as a cause, or (3) as an effect.

(1). If we know that a thing exists by observation we know it as an *object*, and by its properties, and we can, of course, predicate of it any one or all of those properties by which it is observed.

(2). If we know it as a *cause*, we know it by reasoning from some observed effect. We know it, moreover, as in the act or mode of causation, and as possessing the properties by which it can be the cause of such an effect.

(3). If we know it as the *effect* of an operation or process, or we know it as the effect or result of observed causes, which are known to be in operation. We know from the nature of the causes and their mode of operation, something of the nature of the effect they will produce, and this nature is a mode of the effect itself.

392. *Hence we never know or can prove that a thing or object exists without knowing something more than the mere fact of its existence.* We always know something about it, some of its properties and modes, something of its nature.

393. I have said that there are but three ways of knowing or proving the existence of an object. Of the former of these three ways, observation including sense-perception and consciousness, we have examples and illustrations in every act of perception that takes place. We perceive the object, and of course, can predicate of it what we perceive it to be. We give it a name which may be at first an individual or proper name, and then on seeing another object like it, we give to it the same name; the individual term becomes *generalized*, and is a common noun, and thus it comes to pass that but very

few of the objects of knowledge, of which we have occasion to speak, have proper or individual names. Mountains, Rivers, Continents, States, Towns, persons; and a few of the other objects that we have most frequent occasion to speak of, as a pet dog, horse, etc., have proper names. But with regard to other objects, when we wish to individualize them in speaking of them, we are obliged to use some descriptive article, pronoun or phrase, ascribing to them some inseparable accident.

394. Of the second kind we have examples in the discovery of the planet Neptune, by means of a perturbation in the motion of the planet next to it in the order of exteriority. The astronomer, Leverrier, knew the perturbation as an effect, and from the study of it came to know that there was another body or mass of matter, in a certain direction and at a certain distance, etc. The existence of the supposed agents, heat, light, electricity, rests upon this kind of cognition. What they are *in themselves* we do not know. We only know what they do. We know them—if at all—only as causes of certain observed effects.

395. What may be thus proved to exist as a cause need not be the efficient cause as described in the preceding classification of causes (§ 201). It may be a cause in any one of the senses there given, efficient, occasional, instrumental, material, formal, or final, according to the nature of the effect and as its nature and condition demand.

396. And so, too, we may reason from an effect to a "*condition*," that is the condition in which something else is now existing or has existed, at some preceding time. Thus, the fact that a man died on Wednesday, for example, is proof that he was alive on the day preceding, though his being alive on that day was not a

cause, in any recognized sense of the word cause, of his dying the next day.

397. A *real cause*, *causa vera*, must always be denoted by a *positive* term, but a *condition* will be denoted by an *abstract* term; and not only so, but the abstract term will denote only a separable accident.

398. In the third place there are certain processes which are supposed to produce, or to have, as results, objects of which we know nothing except what is indicated to us by the process. Thus we speak of the results of addition, subtraction, multiplication, division, etc., as "amounts," "remainders," "products," "quotients," etc. The words "substance" and "space" are of this kind. We suppose all the properties of an object to be withdrawn or taken from it and call that which remains or would remain, if in fact anything would remain of it, if such a process were at all possible, "substance." Or, if an object have form and solidity, we suppose it annihilated and call that which would remain where it was—"space."

399. Then we have sometimes a combination of the last two methods called reasoning from a "*sign*." A sign is always an effect, and will be an object in a certain state. We reason from it as an effect to its cause and then from that cause to another effect, which, in consequence of that activity by which it produced the first effect, it must have produced the other also. Thus, if the mercury in the thermometer stands at a certain degree below freezing point, for example, it, as an effect, proves that as a cause the air is below freezing also. But if the air is at that temperature it must have frozen the water, the ground, or other substances, according to the circumstances, although the freezing of the water and the sinking of the mercury in the ther-



mometer were in no recognized sense of the words related as cause and effect to each other. They are both effects of a cause common to them both, and they are *signs* of each other, so that the one could not be produced without the production of the other.

400. But the "causes" and the "effects," alike, from which we reason, must have been observed as facts. Hence the two last named methods of proving individual propositions rest upon and pre-suppose the first and the first is observation, external and by sense-perception, or internal and by consciousness. And the observations which other persons make can always be made available to us by the intervention of Testimony.

401. In Observation, whether by sense-perception or consciousness, the only thing that is absolutely true is the fact or state of consciousness. I say, "I see a pen." This implies more than a fact of consciousness. It implies that there is a pen that is seen. This is an inference from the consciousness of seeing it; and the possibility of abnormal activity of the organs, of mistaking the object, etc., etc., must all be taken into account, for even in hallucination and dreams there is the consciousness of the mental act or state which we call perceiving.

402. *Testimony* is based on observation, and is therefore accessory and subsidiary to the first only, of these methods of cognition. It is the substitution of observations made by other persons for our own personal observation.

403. In this case, the value of the testimony is commonly held to depend on the following conditions:

(1). The *opportunity* to make the observation, to see, hear, etc., what is testified to.

(2). *Honesty*, or disposition to tell the truth concerning what was observed.

(3). *Sagacity* in discriminating the observed fact from any theory concerning it, or any play of fancy or imagination while in the act of perceiving it.

(4). *Freedom from prejudice* in one direction or another that may operate upon the memory of what was observed or dispose one to exaggeration.

404. What I have thus spoken of, it will be carefully noted, is *positive testimony to an affirmative proposition*, as when one says S is P.

405. But we have two other cases, (1) affirmation of a negative proposition, or what is logically the same, the denial of an affirmative proposition, as when I affirm that S is not P, or I deny that S is P, and (2) what is called "negative testimony," that is, the omission to mention the subject at all.

406. It is commonly held that positive testimony to an affirmative proposition is of more force than affirmative testimony to a negative. This is correct as a general rule. The reason for this doctrine is to be found in the psychology of the cases. Such an affirmation implies the act of observation and also a distinct recollection of it. The affirmation of a negative also implies an act of observation and a recollection of *that act*. But it also implies something more; it implies thought and reasoning at the time, noticing the absence of that, the presence of which is denied. Thus, suppose two witnesses, each testifying to having seen a man on a certain occasion, the one says he had a glove on his right hand, and the other says he had not. Now the witness who says that he had the glove on, is, on the whole, and in general, the most likely to be right. *He saw the glove*, the other man *did not see it*; but his not seeing it may have been the result of inattention on his part, as well as the absence of the glove.

407. In such cases, however, a good deal depends upon the peculiarities of each case. If in the case just supposed there was anything to make the absence of the glove remarkable, and contrary to expectation, then the man who gives the negative testimony, is doubtless to be regarded as the most reliable witness in this case; that is, he is less likely to be mistaken than the other person, who expecting that there was a glove, may have imagined its presence without seeing it at the time and now thinks he saw it.

408. It may therefore be laid down as a better statement of the law in the case, that, other things being equal, that testimony is to be preferred which affirms a state of facts which was in itself least expected and therefore most likely to attract attention and fix itself in memory. If, however, the state of facts was so contrary to expectation and the common experience of mankind as to be considered improbable, a question will always arise as to the veracity of the witness, as well as to the probability of his having been mistaken at the time.

409. In the other case, we have what is sometimes called negative testimony. It is rather the *absence* of testimony, the total failure to mention or speak of that which is the subject of inquiry.

410. Thus, I believe that in all the writings in the Scriptures, there is no mention of the fact that St. Paul ever undressed himself in order to go to bed at night. And yet in this case the absence is really no proof that the Apostle did not conform to what is otherwise known to have been the general custom of his age and nation.

411. But suppose the matter in question had been something unusual, contrary to what is known to have been the custom of the age, the omission to speak of it if it had occurred, or its mention if it had not, would certainly

require to be accounted for, and would therefore be of some value as testimony. In all historic narrations, thousands of little details that always occur, are not mentioned, while, whatever is unusual, whether by its occurrence or its omission, is likely to be mentioned and is in fact just the kind of incident that makes the staple of history.

412. And for this reason an incidental mention of a fact is often of more value than a direct or even an emphatic assertion of it. The incidental allusion to a fact implies that it was generally known and universally believed, while an express or emphatic assertion implies that the matter asserted was either so little known, so improbable in its character, or, perhaps, so extensively denied, as to be in need of additional testimony. Thus, St. Paul asks "Have we not power to lead about a \* \* \* wife as well as \* \* \* Cephas?" Now in this the Apostle does not assert that Cephas (who is supposed to have been Peter) had a wife, but he implies it and alludes to the fact as if it were well known and undisputed. Or when a Greek historian, Thucydides, speaks of a certain city as being near to the place where Xerxes dug the canal across the island of Eubœa, his testimony to the fact of such a canal having been cut there, is regarded as stronger than if he had expressly affirmed it.

413. Hume's sophism, that "nothing can be proved by testimony which is more improbable than the falsity of testimony," has enough of truth in it to make it pungent as an antithesis and enough of error to make it dangerous as a maxim. Nothing can, of course, be proved by the testimony of any one witness which is more improbable than it is that he should be wrong in his testimony, whether from intentional falsehood or unavoidable mistake. But that nothing, that is more improbable than

the falsity of any one testimony or source of proof, can be proved by the combined and concurrent force of testimony of various kinds and from various sources, is a proposition that will not be assented to for a moment by any one who knows its meaning or import. A fact *may* be proved in this way with a force of conclusion that is greater than that of even a mathematical demonstration. So true is this, that any fact that is so proved, will be held to and acted upon, notwithstanding any amount of reasoning or demonstration that may be brought to bear against it.

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## SECTION IV.

## PARTIAL PROPOSITIONS.

414. Partial propositions are of two kinds in reference to the ground on which they are affirmed, although there is nothing to indicate this difference in their form.

415. In the first place they are but an aggregation of several individual propositions. We see one man that has red hair, then another that has red hair, and so on until we say, as the result of our observation, that "Some men have red hair." And we thus, virtually express a doubt, or at least some measure of uncertainty whether the proposition would be true if it were made general. There is usually something in the nature of the predicate that gives rise to such a doubt.

416. But in the other case, the partial proposition is the result of the conversion by limitation of a general or universal proposition, as "All A are B, therefore, some B are A." In this case, generalization, whether by induction or otherwise, must have occurred between the obser-

uations on which the individual proposition rested and the partial proposition, as well as the conversion which preceded it. And the partial proposition has, therefore, the same measure of certainty and of uncertainty, or of doubt also, as belonged to the general proposition—the *exposita*—from which it was derived.

417. What I have to say of partial propositions in this place relates to those of the first named class. They are like individual propositions in respect to the ways in which they can be proved. We are obliged to prove the predicate of each individual separately. But in fact, the proof of a predicate of any one individual object makes its affirmation of others in the same natural species probable. If once a man has been born without hands it is probable that others have been born into the world with that form of monstrosity also. If once in the experience of man, a stone has been known to fall from the atmosphere—a meteorite—it is probable that more than one has so fallen.

418. But again it will sometimes happen that we can prove a partial proposition when the predicate cannot be proved to a certainty of any one individual. Thus, in the dusk of evening, we may have, from observation, abundant proof that there are *some* men standing on a distant eminence, when our means of knowledge or proof would not enable us to name one single individual who was there. In the same way, we may be able to demonstrate from the nature of perception, etc., the proposition that "Some of the objects we think we see around us are real," while it would be impossible to prove with like certainty the reality of any one particular object as against the possibility of a false perception, or hallucination.

419. Hence, in some cases, the certainty of the truth

of a partial proposition will be greater than that which pertains to any one of the individual propositions that are subsumed under it. This results from the nature of our method of proof and from the uncertainty that attaches to each particular act of observation. And the amount of certainty may be regarded as a probability, coming under the formula given for computing the force of the elements in a cumulative argument, (§ 256). The uncertainty will be an improbability of the truth, or probability of the falsity of the proposition, which will diminish towards zero under the formula for computing the form of mere probable arguments, (§ 223): that is, the probability of the same mistake occurring in repeated instances under different circumstances must be a diminishing probability, and as it diminishes, the certainty of the result of the observation increases towards an absolute certainty.

420. There is, of course, always some measure of uncertainty or doubt in regard to the truth of any individual proposition. If it rests on observation, there is the possibility of false-perception, hallucination, etc., which becomes greater just in proportion to the improbability of the event itself. If it rests on testimony, there is of course, therefore, an additional possibility of error in this source or means of proof. If upon demonstration—either (1) from effect to cause, or (2) from cause to effect—there is always an element of uncertainty in the fallibility of human insight in detecting this relation.

421. Now when this uncertainty arises from any one cause and pertains to several propositions, it of course affects them all alike—whatever may be the method of their proof. But in such cases, it must be known—that is we must know—precisely what it is or we cannot know that it is common to all the propositions asserted on the

ground of proof affected by it. Thus, if a man has a defect in his eye-sight—color-blindness, for example—this cause of uncertainty in anything that he may assert concerning color will effect all such assertions alike. If one be an opium eater, the effect of this drug on the mental operations is such that it gives a like uncertainty to any and all the assertions such a person may make. So, too, the imperfections of any instrument—thermometer, weighing-scales, measuring rod, barometer, etc.—will affect equally and alike any statement of a result obtained by the use of such instruments; and the uncertainty does not decrease with any increase in the number of observations. The ratio of the certainty to the uncertainty, or of the probability to the improbability, will be a constant quantity whatever may be the number of propositions that may be affected by the cause of the uncertainty. If it be one to ten in one proposition, it will be ten to a hundred in ten propositions.

422. But when the cause of uncertainty is not common to them all, but is peculiar to each, whatever it may be, the combined uncertainty is less in two propositions than in either of them taken by itself; and so on decreasing with the number of cases. This, of course, supposes that there was no motive to mistate, no intentional misrepresentation of facts. It becomes really a case of concurrence of testimony. The fact of the truth of a statement is always in and of itself a sufficient explanation of the agreement of the witnesses testifying to it. But the agreement, when the statement is untrue, becomes a phenomenon to be accounted for. Collusion and intentional falsification is the first explanation that is likely to occur to the mind. But when this is found to have been impossible, another explanation must be sought, and unless some satisfactory explanation is found,



the improbability of any other explanation than the reality of the event asserted increases with the number of witnesses, assertions or circumstances until it becomes so great that the certainty is regarded as absolute. It is even practically greater than demonstration.

423. This remark, however, cannot be extended to general propositions. Thus, from the nature of the argument in favor of miracles, for example, it is more certain that some miracles have been wrought than it can be that any particular miracle was wrought. And yet it is less certain that *all* the events that are claimed as miraculous ever occurred than that any particular miracle was wrought. It is more certain that some of the objects we see are real than that any one of them is so, and yet less certain that they are all, without exception, real, with no false perception and no hallucination, than that any particular one of them, even the least certain is a reality.

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## SECTION V.

### GENERAL PROPOSITIONS.

424. A general proposition always implies a course of reasoning, and so, in one sense, is the statement of a matter of opinion, which, however, is often regarded as a matter of fact—a general fact.

425. As the subject of such a proposition is always general, the individuals comprehended in the class will be of two kinds, *examples* and *exceptions*—the one conforming to the rule and the other not. Thus, “mammals live on land,” this is the rule. But whales are mammals, and yet they live in the water; hence, they are an exception to the rule.

426. Exceptions and Examples must, of course, belong to the same natural class, as "mammals" in the above example. And when the exceptions become very numerous the rule is of but very little value as a rule; and if the exceptions should become more numerous than the examples, the rule would be reversed, and its contrary—not its contradictory—would be the rule.

427. The maxim, "*exceptio probat regulam*," is true only as we understand the "exceptio" to refer to the act of noting an individual as an exception. For, if the rule were not otherwise than the exception, the contrariety or departure from it would not be noticed.

428. General propositions are formed by Induction. In Deduction the Major Premise—that which is regarded as such—is more comprehensive than the conclusion. Hence, in such formulæ we reason from the general to the particular or individual. For example, let us take the letters of the Alphabet in this order: A, B, C, etc., and representing a series of subordinate classes, A being infima species and Z the summum genus, and we have A are B, B are C, C are D, therefore, A are D. It is obvious that while the subject of the conclusion is the lowest in the series of any that is used in the formula, the predicate of the conclusion is the highest. This is the order of *Deduction*.

429. But in the inverse order called *Induction*, we begin with the individual object and have for the subject of our conclusion a term denoting a class and therefore much more comprehensive than the term we start with.

439. Induction, strictly speaking, is a word that denotes merely the process of bringing in the facts or individual objects to enable us to generalize a conclusion, that is, to enlarge the sphere of the class of which we affirm a predicate. If, for example we say, "this horse

is a ruminant," our assertion is less general or comprehensive than if we say "horses," or "all horses" are "ruminant," and still less general than if we say "all hoofed animals are ruminant;" that is, while the predicate remains the same, the subject becomes larger in its comprehension as it includes more individuals.

431. In all cases of pure demonstration, we generalize at once, because in demonstration, we never introduce any merely accidental matter. Thus if we prove that the angles of *one* triangle are equal to two right angles, we instantly and immediately affirm that in *all* triangles the sum of the angles is equal, etc.; simply because we had been reasoning upon the *nature* of a triangle and had not taken into the scope of our argument anything that is peculiar to any one class of them. In demonstration however, we deal with things *in the abstract*, as the expression is, that is, we speak of them and consider them in reference to their essential nature, and regardless of those properties which make up their *actual* and *varying* conditions; therefore, what is true of one must be true of all its species at all times in all places, and under all conditions and circumstances. Hence, such truths are called *absolute* truths.

432. But the moment we come to deal with and reason about things *in the concrete* as they exist, and as we observe them in nature before we can reason by demonstration concerning them, we must distinguish between the essential and the accidental properties. This we do partly by an immediate insight into their nature; but for the most part we must make comparisons and examine objects in various relations. And we thus find that what is to be regarded as essential in one relation, is only accidental in another. Thus, take iron as an example, its *weight* is the only thing that is essential, if we use it

merely for its weight as ballast in a ship. Its form is essential if we use it for cannon shot. Its ductility is essential if we use it for wire ; its susceptibility to magnetism if we would make it into needles for a Surveyor's compass.

433. Induction is spoken of as the method by which we establish or discover, and discover that we may establish, what are called the general laws or principles of Nature. The methods of induction depend so much upon the peculiarities of the subject matter with which the process is concerned, that all the general principles that fall within the province of Logic, are very general and can be very easily and briefly stated. But they are at the same time so general, that any such statement of them can have but very little practical value.

434. Induction depends upon the following first principles in the law of classification, and the relation of objects one to another.

(1). Any property that may be ascribed to more than one individual object, and is not a separable accident merely, it is a common property.

(2). Any common property that may be ascribed to several objects in any one class, may be ascribed to some and just as many objects in any higher class up to, and including the summum genus-

(3). Any property that may be ascribed to several individuals in a class, may be made the differentia of the class, and thus the basis of a classification.

(4). Any property that may be made a differentia is also a formal property, (a formal cause in the Scholastic use of terms), and implies some other property, as a modal or final cause, which may therefore be ascribed to the class of which the formal property is differentia.

435. It will be observed that in the above stated rules,

the words "property that may be ascribed to," are equivalent to "a term that may be predicated of," used in the discussion of the deductive formula; since whenever a property may be ascribed to anything, the term denoting that property may be affirmed or predicated of the term denoting that object, used as the subject of a proposition.

436. The first three of these rules need no illustration or proof, the last, however, may be better for a word.

We have already seen in our remarks on demonstration, that any one property in an object always implies some other property inhering in the same object. Thus extension implies divisibility, etc. In like manner any property in an object implies some other, both in (1) its other moods and separable accidents, and (2) in its relations to other things. Thus eating is a separable accident of an animal, since it is not always eating, but the kind of food and manner of eating depend upon the form of its mouth, the structure of its digestive apparatus, etc. And these last are inseparable and common properties in the constitution of the animal; they are such, moreover, as to indicate to the experienced observer what is the kind of food and mode of eating which they occasion; they stand in the relation of cause and effect to it.

437. When, therefore we can discern any such property in one object, we can make it the differentia of a species, and may at once and on that ground, affirm the modal property of the species thus made, as a class.

438. In the process of arriving at such generalizations, however, there are several intermediate steps, which have indeed been variously stated and explained, and which may, perhaps, be best described as follows:

(1). In the first place we group objects together in a

*natural* classificatin based upon the more obvious properties that are essential to the individuals.

(2). We next find that some less obvious property, mode of life, or action, pertains to some one of the individuals in one of these classes.

(3). We then examine others of the class and find the same property to be true of them, and then finally:

(4). We infer that it is true of all the individuals in the class.

439. Take as an illustration. After having observed the resemblance between certain animals, which we call *cows*, for example, we see that one of them, after clipping the grass for her morning's meal, retires to a shady place and raises what she has swallowed, and chews or masticates anew. We find on examination that others of the same species do the same thing in all its essential features. The question may then arise whether the females alone do this, or whether the males of the same species "chew the cud" also. Having found that they do, we next investigate to see if other animals of other natural species, as sheep, camels, etc., do so likewise. And we proceed in this way until we group together several species into a class, whose distinguishing trait is that they "chew the cud," and call them "ruminants," and then say "that all ruminants chew the cud." This is, of course, a definition. But as we proceed we find other properties common to all ruminants, and accompanying the mode denoted by the word "ruminating," such as structure of teeth, stomach, intestinal canal, hoofs, etc., etc., so that after induction has been completed, we feel safe in predicating any one of these properties or modes, of any animal or class of animals which we have found to possess any other of them.

And this is all there is of the general or logical princi-

ples of induction that can be explained except as in each science we explain the details of the application of the method by reference to and in connection with the discussion of the nature of the subject to which we are to apply our method.

440. In most cases we find these properties connected as cause and effect under some of the different senses of the word. In many cases, however, we can go no farther by our induction, than merely to affirm a general fact. Thus, it is a general fact that all resinous bodies (so far as yet known), have certain electrical properties. No reason, however, has yet been discovered, or can now be assigned, why resins should thus affect other bodies when they are electrically excited. We see no connection of cause and effect between the natural peculiarities of resins and the electric effects they produce, no such connection, for example, as we see between the structure of the stomach and rumination in the ruminants, or between teeth and the carnivorous habits of the carnivora.

441. Now, undoubtedly, any process of induction may be stated as an Enthymeme with the Minor Premise stated in detail, thus:

*a* is P,

*b* is P,

*c* is P,

*therefore*, S, (which is the class of which *a*, *b* and *c* are individuals,) are P, the prosyllogism in the parenthesis being always assumed, though not often expressly stated. But it manifestly assumes the not-expressed Major Premise, "what is true of the individuals *a*, *b*, *c*, etc., (which have been examined,) is true of all the rest of the class," though they have not been examined.

442. But on what ground can we make this assertion? Or what right have we to assume this Major Premise?

Manifestly on the ground of some insight into the connection, as of cause and effect, between the property which we make the differentia of the class, and P, the property or mode which we affirm of them in the conclusion; otherwise our conclusion could have no more than a vague and uncertain probability based on the analogy or resemblance of the objects actually examined.

443. It is very important for the completeness and clearness of scientific discussion that the classification should be based upon those properties, as differentia of species, that are the most central and controlling in the organization, means and habits of life, those which are the causes that determine and necessitate the rest. Hence, in order to attain this stage of science, there have been frequent changes in the classifications and nomenclature in all of the natural sciences, chemistry, mineralogy, botany, zoology, etc., etc., each successive founder of a new system aiming to introduce a nomenclature in which the names, classes and species should be to the greatest extent possible, indicative and suggestive of the nature and habits of the individuals it denotes.

444. It is obvious from the nature of the method of proving general propositions, that no person can prove a general proposition who has not proved the truth of some one, at least, of the individual propositions coming under it. Thus, no one can prove, or have any right to assert that "Whales are mammals," for example, who cannot show in regard to some particular whale that it is a mammal. A knowledge of individuals necessarily precedes the assent to general propositions in the order of knowledge. Of course, one may take a general proposition on authority, without such knowledge of individual cases. This, however, is mere belief, and not knowledge.



445. This rule, however, does not always apply to partial propositions. For example, I may see in the dusk of evening that there are some men on a distant hill, without being able to name or identify any one person so as to say that *he* was there.

446. Besides induction, we have another process, *Average*, by which we arrive at general facts. The result of an average differs from a generalization not only in the process but also in the character of the proposition obtained. The proposition will not be true (precisely) of each of the individuals and need not be true of any of them. Thus, suppose one takes note of the weight of the mercury in a barometer for some hundreds of times, at all hours of the day, and in all kinds of temperature and of weather, and divides the sum by the number of observations, he gets the average height, which gives him a *datum* on which to estimate the weight of the atmosphere, the height of the place above the sea level, etc. It is, however, barely possible, though not at all likely, that the instrument may not have been observed at that exact height at any one time of observation. Nevertheless, the facts thus obtained are often of the utmost importance in science and in the practical affairs of life.

447. Average is also a method of *approaching* a fact which is often available when no exact observation can be made. Suppose, for example, a mariner at sea wishes to take an observation of the sun or some star, and the vessel rocks so that he can get no exact observation. He can take several, and thus, by an average of them, make the errors neutralize and counteract each other, until the result will be a very close approximation to the exact fact, possibly the exact fact itself.

448. It is, in fact, seldom the case that important observations can be taken without some liability to error,

which must be provided for and guarded against in this way. There is usually some excitement of the nerves themselves, there is some error in the instruments, etc., that needs to be guarded against. Even the varying size of the pupil of the eye of the observer, has been found to be a cause of difference in the reported results of observations in some of the more delicate of the efforts to obtain exact data for astronomical calculations. And for all these sources of error, average is the best remedy that has been yet provided.

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## SECTION VI.

### UNIVERSAL PROPOSITIONS.

449. A universal proposition differs from an individual proposition in that while the latter affirms a predicate of only one object, that is an object that is *logically* an individual, though *physically* complex, and made up of parts; the former affirms its predicate of a class of individuals; and it differs from a *general* proposition in that while to a general proposition there may be exceptions, the universal proposition, if it be universal in its nature and not from mere accident, can admit of no exceptions.

450. A universal proposition can be proved in three ways only, (1) by demonstration *a priori* from the nature of the subject matter, (2) by actual inspection of the individuals included within the scope of the assertion, as when I say that "All the pennies in my hand were coined in a given year," I can know this only by inspecting them all; (3) by authority.

451. The first kind may be called Universal *a priori*, and may include any number of individuals; the second

Universal *a posteriori*, and can include only the observed individuals; the third are Universal *by authority*, and can include only the cases expressly named, or precisely described in the act that makes the proposition true.

453. Authority in the sense here used, is different from testimony, and creates or produces the truth which it asserts or declares, as when the Creator pronounced all the seventh days holy, the command or declaration made them so, and impressed upon them a character which they had not *per se*, or in themselves.

454. In demonstration or reasoning from the nature of the subject, no particular form is used, and any and all valid forms may be used: and all the reasoning can be reduced to the formulæ that have been considered. But demonstration is always first in the order of time, and must enter in, as a part of all reasoning; and all reasoning, as well as the proof of the rules and formulæ of reasoning, must be proved and established by it.

455. Demonstration is, as we have said, called analytical reasoning, because it reasons from the nature of the subject by means of analysis.

456. Analysis is of *three* kinds (two of which we have already explained) namely, (1) Physical, (2) Logical (3) Mathematical. *Physical* analysis resolves a compound into its component parts, as in Chemistry. *Logical* analysis resolves the conception of an object into the properties of the object itself. *Mathematical* analysis consists in making such changes in the form of an equation as that any one of the terms may be made the first member, and the others, constituting the second; will show its nature and value.

457. The word demonstration, in its most general use, is applied also to the three different processes, according to the three different kinds of analysis.

(1) *Physical Demonstration*, as in Chemistry and Anatomy. In Chemistry, the demonstration consists in showing by analysis (Chemical analysis), the elementary parts of which any compound is composed; the laws of this method of reasoning Chemistry itself explains. It tells us how we may separate a compound, so as to find its components, and how to find and identify and weigh them after the analysis. In Anatomy, the process is rather division than analysis—or, to use the technical expression, it is *dissection*. Division separates the parts without changing them. But in analysis, the parts exhibit properties and qualities that were not obvious before.

(2). *Mathematical Demonstration*. This is of two kinds, (1) Algebraic. (2) Geometric. In the first we resolve the equations into parts called terms—connected by certain algebraic signs. Algebra teaches how we may change these terms without affecting the value of the equation. And with each change in the form of the equation, some new truth that was implied in it—although not obvious before—becomes obvious, as though it were the only one for which the equation was designed. In the second case or Geometric Demonstration, which is really one form of Logical Demonstration, we begin with the line and angle, etc., and end in proving a property of the line or angle.

(3) But that which is more especially called demonstration, is *Logical Demonstration*. In this, as I have said, we reason from the nature of the thing—that is, its *essential* properties. And before there can be either physical or mathematical demonstration, there must have been some acts of logical demonstration. Mathematics, for example begins with axioms and definitions. Chemistry assumes both, if it does not expressly state them. It has

its definitions of its elementary substances; and the two axioms at least: (1) that in analysis and synthesis we neither create nor destroy any particle of matter, and (2) that when any two substances that have been together without chemical action upon each for any length of time, begin to act, there is proof of the influence of some other agent acting upon them.

458. Demonstration may have for its starting point, either (1) a fact, or (2) a definition, or as it is more commonly expressed a conception.

459. A mathematical demonstration is one that begins, not with a thing or an object, but with a conception—an abstraction—an objectified abstraction, as are all of the so-called objects of mathematics, number, form lines, angles, etc. No such things exist as objects. A line, for example, that has length without breadth is an impossibility. And all such demonstrations end in proving only a possible property or a necessary condition. Thus, when we prove in terms that "Any one side of a triangle is less than the sum of the other two sides," we do not necessarily know or believe that there is any thing that is triangular in form actually in existence. And all that we prove is that, if there is any such thing in existence, it must be true, from the very nature of things, that any one side will be less than the sum of the length of the other two.

460. But a demonstration may begin with a fact or an object, and prove from it the existence of some other fact or object. The object must be one that has been observed, and it must be regarded as either cause or effect. Of this we have had examples and illustrations already (§§ 392, 394)

461. In reasoning from facts, we begin with an analysis which is for the most part assumed as having been

made, rather than formally and expressly made as a part of the argument.' And that which we first prove is the existence of some other object or fact. But for reasons already assigned, the reasoning that proves the existence of the object or the reality of the fact, proves also something more than its existence; it proves something concerning some of its properties, modes, attributes, and, if the argument be from effect to cause, it proves also some of the laws under which it acts.

462. Demonstration is made possible by the fact that there is no one property or object of thought that does not imply another. Thus, the straightness of a line implies its shortestness although it is not the same thing; the extension of a body implies its divisibility, etc. Hence any property that is used as the differentia in a definition implies some other property which is not affirmed in the definition, and that, some other property, and so on. This relation of properties is, however, a matter of insight. It cannot be demonstrated any more than we can demonstrate by reasoning, the color of a rose.

463. As the properties which we ascribe to an object in its definition are obtained by an analysis, a definition is called an analytical proposition. But those which we affirm on the ground that they are implied by the definition, are called synthetic propositions. When, however, a proposition is proved by an appeal to facts rather than by demonstration *a priori*, it is an *a posteriori* proposition. Analytic propositions and propositions that are synthetic *a priori* constitute what is called *necessary* matter while *a posteriori* propositions constitute what is called *contingent* matter.

464. Demonstration, therefore, can admit into its sphere only *a priori* propositions, propositions in necessary matter, either analytic or synthetic *a priori*. Or, in other

words, it can deal only with the *essential* properties of things. In mathematics it deals with their form and their number; in all other departments, with whatever constitutes or may be assumed as constituting their *essential* nature.

465. Hence, if the demonstration be good, the fact—if it be a fact and is proved—can admit of no doubt or successful contradiction; and if it be a general proposition it must be universal also, and can admit of no exceptions. It must be absolutely true, true for all times and places, and under all circumstances. It will be seen and felt to be true by all intelligent beings just so soon as they comprehend the reasoning by which it is demonstrated.

466. The certainty of demonstration depends in the last analysis on the principles of Identity and Contradiction.

467. I have spoken of three ways of effecting a demonstration or proving the truth of a universal proposition, as distinguished from a mere general proposition. And I have said that there are but the three. This, however, is contrary to the common opinion, and many there are who hold to the inductive method—or proof by facts—as constituting the only reliable method of establishing universal truths, especially in the department of physical and social science.

468. Of my doctrine, however, several demonstrations may be given. Thus, suppose we have the terms  $x^2 + x + 41$ , and expand it into a series, then making  $x$  successively equal

to 0, we have 41,

“ 1, “ “  $1 + 1 + 41, = 43,$

“ 2, “ “  $4 + 2 + 41, = 47,$

“ 3, “ “  $9 + 3 + 41, = 53,$

“ 4, “ “  $16 + 4 + 41, = 61,$

and so on; the result will be in each case a *prime* num-

ber for some forty or fifty times, and then for a few times the number will not be prime.

469. But again, we have a more general form. Every fact is the product of causes, which, considered as producing the effect by motion or change, are called "forces." Not only is every object that we observe considered as an object, or substantially, a product or an effect, but moreover, each state of the object is, in like manner, the result of the forces that have been at work upon it, and so not only a sign and an indication of their character, but it is also a measure of the intensity and direction of their resultant. If the forces are constant, the line will be a straight one, and of course, any two points will determine the direction or law. But the forces may be of any varying intensity.

470. We may illustrate this by supposing a man sitting in his buggy, and riding in a certain direction, say westward. If now, he fixes his attention on any point in the rim of one of the wheels of his vehicle, it will appear to him to move, by turns, in all directions—now forward, then downward, then backward and then upwards again. And if, instead of revolving several times a second, it revolved but once in his life time, he could collect any number of facts, make any number of observations to prove that that particular object in the rim of his wheel, say a nail-head, was moving in any one of all possible directions that lie in the plain of the wheel's motion, and none of them, perhaps, would indicate that the wheel itself was moving westward or that the general tendency of the nail was in that direction.

471. To illustrate the case still further, we know that water increases in specific gravity as it cools from 212 degrees down. Now between 212 degrees and 40 degrees, for example, we may have any number of observations,



all tending to prove the general law, that as water becomes colder it grows more dense. But at 39.5 degrees, we find a point of inflection, so to call it; for below that temperature, water grows less dense with loss of temperature.

473. So in Political Economy, we find in a great number of stages in society, that wealth increases faster than population. From this we might infer as Carey, Smith, and others have done, a universal law that wealth increases faster than population. But in other stages, undoubtedly, wealth decreases, hence other writers, as Malthus, Ricardo, and the English writers generally, have inferred that the law is, that property decreases with the increase of population, (that is, in proportion to numbers), and that the cases where it increases in proportion to numbers are exceptions to the general rule. But in both cases and in all cases, if we can recur to the forces that produce the change, and ascertain their nature and the law of their action, we can find what is the law of change, and shall probably find that to that law, when fairly known and accurately stated, there are no exceptions; the existence of recognized exceptions being in all cases, as I think, the proof of inadequate statements; statements that are inadequate because of imperfect comprehension and inaccurate generalization.

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## SECTION VII.

### PROBABLE PROPOSITIONS.

472. We make a proposition probable in contingent matter by (1) showing a sufficient cause, which will consist for the most part, in mere *physical* matter, the phenomena of the inanimate world, in showing an effi-

cient and an occasional cause, with the proper conditions; and in *moral* matter the actions of rational beings and moral agents, final cause, as motive, takes the place of occasional cause in physical matter, or (2) by showing an analogous case, by showing, that is, that something like it has occurred. Thus we render the Christian miracles probable by showing that the Creator has interposed from time to time, in the geological ages to introduce new species of plants and animals, and establish new orders of things.

474. The Argument from *Analogy* is often used with a good deal of rhetorical effect. Its real logical force, however, is much less. In fact, the word "analogy" is used somewhat vaguely and indefinitely, so that it is difficult to say precisely what its force is without knowing something beforehand of what is meant by it.

475. It is not uncommon to have an argument which is entirely of the nature of an Induction, though somewhat incomplete, and less conclusive than Induction usually is, spoken of as *Analogy*. When the argument or inference is based on the resemblance of *objects* one to another, it has the nature of an Induction. Whereas *Analogy* has been defined to be "a resemblance of ratios," as has already been said.

476. There are no two objects within the range of our thought, that do not resemble each other in *some respect*. But this similarity is not usually called resemblance unless it be in some obvious or conspicuous property. Hence, objects and events are said to resemble each other when they are obviously or strikingly alike. Such a resemblance, however, can hardly be regarded as the basis of an argument in itself considered. We must look deeper into the matter before we can make any such use of it.

477. Every substantial object whether matter or mind is always a true cause—*causa vera*, though not always acting as a cause—*causa causans*. And moreover, it is a cause in different relations—and productive of different classes of effects by, or in consequence of its properties; each property being connected with a class of effects that are peculiar to itself. Thus, this piece of paper as a hard substance, will produce certain effects that it could not produce if it were soft; as white it will produce other effects that it could not produce if it were of any other color, and so of the rest. Now by these properties hardness, color, etc., etc., objects resemble each other.

478. But in reference to their mode of operation in producing their effects they are “*analogous* ;” that is the ratio or relation of any one to its appropriate effect is the same as that of any other of them to its appropriate effect. Hence resemblance always implies analogy; resemblance of objects in their color for example, implies analogy in their relations to other objects, in so far as those objects are affected by their color. So, again, the seeds of different plants always resemble one another in some of those properties in consequence of which they are seeds. And it is in consequence of those properties that they act as germs that grow into plants. Hence, also they are analagous—the relations of any one to the tree or plant that grows from it being the same as that of any other to the tree or plant that grows from it.

479. In the same way also the seed of a plant, and the egg or *ovum* of an animal have some points of resemblance in the essentia of the proximate genus to which they both belong. And they are analogous too—the relation of the seed to the plant being the same as that of the ovum to the animal.

480. And finally there may be an observed analogy where there is no obvious resemblance that would lead us to expect it; that is, in cases where we do not know what it is in either of the objects that occasions the change or transformation. Thus, there is an analogy between the passage of an insect through the chrysalis state and the change of a tad-pole into the frog, though we could hardly reason from the one to the other, or point out the resemblance on which it is based.

481. If we know beforehand that the relation or ratio between any two pairs of terms respectively is the same and one relation is already known, we can, of course, affirm it of the other pair as a conclusion on the ground of the one that is known. Or if both are unknown, and one is more easily ascertained than the other, we can ascertain that by observation, and affirm the other as an inference or conclusion.

482. But in most cases, when what is called the Argument from Analogy is resorted to, the thing that is unknown is the identity of the relations, and the effort is to prove from the resemblance of the two objects which are different in the two members, that they have a third term common to both members, with an identity of relation between each one of them and the common third term. Thus, in BUTLER'S famous argument for Revealed Religion and especially for the doctrine of the immortality of the soul, he argues from the resemblance between the chrysalis state of the worm, and the fuller development of life in the butterfly to the future life of man.

483. And yet it seems to me that his Argument is valuable only as it is one step in an Induction to show that as a general law of Nature, nothing perishes; it may undergo changes, and great changes, but through all of

them it comes out a reality, changed to some higher form, but not annihilated.

484. Analogy, however, is of great rhetorical force in removing what is sometimes called "the antecedent improbability" of an event or a fact which one wishes to prove real. It shows that things like the one in question have occurred; or, at least, that something as strange and improbable has occurred, and thereby secures attention to the Positive Arguments, and prepares the mind to give them the influence that is justly their due.

485. But even in this case the value of the argument is founded on the resemblance of the two facts or events, and is in so far an Induction, or rather of the nature of an Induction, and comes short of it in precisely that which gives to Induction its concluding force.

486. There is also a method of establishing a very high degree of probability, a degree that is sometimes claimed as demonstrating absolute truth, called by WHATELY "*Progressive Approach*." It is of the nature of demonstration by means of ratios of variation, when the exact condition of one or both variables cannot be, or has not been realized. The ordinary attempt to prove the first law of motion is of this kind. The law is this: "If a body be in motion without any resisting force, it will continue to move forever." The argument is: "If we roll a ball, for instance, on a sand-bank, then on a carpeted floor, and then on a marble slab, we find that the length of the time during which it continues to roll, will increase, as the resisting obstacles are diminished. Hence, if resistance could be reduced to zero, the time of continuing to move would become infinite, or the ball would continue to move forever." But we cannot remove all the resisting force, nor can we wait to see whether it would move quite so long as the terms of the proposition

contemplate—"forever"—nor, finally, can we find the exact differential co-efficient so as to be able to demonstrate the exact value of either of the variables from any assumed value of the other. The law can, however, doubtless be proved by demonstration *a priori* from the nature of matter as inert.

487. WHATLEY gives another example, in the case of the argument for the existence of God. He says that "All men, even the lowest in the scale of intelligence, have some ideas of something supernatural, and as we ascend from the lowest stage up to the highest yet attained in any community, we find this idea approaching towards an adequate conception of a One Supreme Being, who is the Creator and Moral Governor of the Universe. Hence, as a state of perfect intelligence is that alone in which the prevalent opinions of men will be all true and adequate, we may assume that the doctrine concerning God, which it is thus shown will then prevail, is the true one, and the one that ought now to be accepted as a matter of belief, and acted upon by faith as a means of moral culture and intellectual progress."

488. The results obtained by these processes, although they may be true—absolutely true—are not, however, shown by the processes to be more than probable, highly probable—having only that degree of probability, which, as it is sufficient for action in most cases, and is all that from the nature of the case we can have, has been called *moral certainty*. But no absolute law can be proved in this way, or by any of the methods of induction and average, as has been shown in the preceding section (§ 467). Still, less therefore, of course, can any form of mere probable argument establish anything that can be properly regarded as an absolute certainty.

489. It will sometimes happen that we can create a presumption in favor of any fact or event by showing that such things are reported or believed to have occurred elsewhere, although the argument is not at all in the nature of analogy. Thus, if we had but one example of the falling of meteorolites, it is doubtful if the reality of the meteorolite in that one case could be effectually established. But if we show that such things have occurred occasionally, or, at least, that such things have been reported and *believed* to have occurred, we render the affirmation of the occurrence of one in any particular case—probable—that is the assertion of its occurrence will, by this means, be made to be regarded as possible, and so we gain attention to the arguments that may be adduced in its favor, which might otherwise fail to receive attention. The popular belief in the possibility of any thing is often practically the most effective part of the proof of its reality.

490. But, in order to make any event seem probable and to remove any antecedent improbability that there may be, we may show

- (1). By analogy, that such things have occurred.
- (2). That the circumstances and conditions of things were such that it might have occurred; and
- (3). That there were causes of one kind or other that could have produced it.

491. Among the causes there must always be an *efficient* cause which is sufficient for the effect, "*causa sufficiens*;" and in *physical* matter an occasional or exciting cause; but in *moral* matter a final cause or motive takes the place of an occasional cause and is, in fact, the occasional cause.

492. But, without first establishing the probability of an event by one or all of these means, it is doubtful if

any amount of positive argument will produce conviction except indeed in those cases in which the antecedent probability of the event is already admitted before we begin our argument.

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## SECTION VIII.

### EXTRA LOGICAL FALLACIES.

493. The Extra Logical Fallacies are of two kinds, those that are *in the Matter*, and those that are *in the Method*.

494. Fallacies in Matter consist in Premises, whether assumed or expressly stated, that are either (1) untrue or (2) irrelevant.

495. If a proposition introduced or assumed by necessary implication is merely untrue, it is said to be a "*Non vera pro vera*," something not true, taken and used as truth.

496. Of course, any Conclusion drawn from such a premise can derive no degree of certainty from the reasoning into which the untruth has entered, as though it were true. Aristotle has strangely enough devoted three chapters of his *Prior Analytics*, (Book II, chapters 2d, 3d and 4th) to a discussion of the cases in which we may have Conclusions that are true from Premises that are confessedly false.

497. It is indeed true that a Premise may be false and the conclusion true. But the conclusion is not *proved* by any such inference. There may be no Fallacy in Form or in Diction, but if one Premise is false no truthfulness or certainty can be derived for the conclusion from that source. Aristotle's examples (one of them) is as follows:



Every stone is an animal:

Every man is a stone:

*Therefore*, Every man is an animal.

The conclusion is true enough while both Premises are false.

498. But suppose we change the Major Premise, and say "Every stone is a quadruped," and we should have in Conclusion every man is a quadruped. It seems manifest that this father of Logic could not have had any very clear and satisfactory comprehension of the nature of reasoning, or he would not have treated this part of his subject as he has done.

499. As there is no limit to error it would be possible to prove anything to be true if by any possible or conceivable formula we could prove a proposition to be true by means of one that is false—except, of course, in that indirect method in which we first prove that what we had assumed as true, is false, and then infer from this proved falsity, the truth of its contradictory. But as truth is one, we are limited by it in the assumptions we can make in regard to any object of thought. "This paper is white," is the only assertion I can make in regard to it with a predicate belonging to the category of color. To say that it is black, or red, or green, etc., are assertions which would, each and all of them, be untrue, if the *one*, "it is white," is true. But the untrue assertions may be as numerous as the predicates denoting colors or shades of colors—minus one.

500. The next form of the Fallacies in Matter is the *Non causa pro causa*.

This differs from the last one named in that the proposition affirmed in this case is true, but irrelevant. That is, it is no Premise to the Conclusion we wish to prove. The old example, "There is a comet, therefore there will

be a famine," is a case of physical cause. The comet is no cause (physical) of a famine, and therefore, no proof (cause logical) of a coming famine. So if one, in attempting to prove that the vertical angles made by two straight lines crossing each other, are equal, should begin by asserting that a straight line is the shortest distance between two points, the proposition would be true enough, but of no use as a means of proving that the opposite vertical angles are equal.

501. It should be understood that any argument when drawn out at full length, and completed by supplying all the suppressed or omitted Premises, would be a Sorites of the form,

A is B  
B is C  
C is D  
etc., etc.

That is, a series of propositions in which, whatever may be their quality, or logical quantity, each term would appear in two consecutive propositions, and each proposition, besides furnishing one term for that which is next to follow, must also contain one that was used in the proposition that preceded it. The only exception to this is the Conclusion, which furnishes no new term, and is made up of one that was contained in the premise last stated, and another in that which was first stated. And if we find on reducing the argument to this formula, and completing it, any Premise that does not work into some such series under this law it is a *Non causa*.

502. *Metabasis*. I have introduced this term borrowed from Aristotle, to denote the Fallacy of applying reasoning which is correct, and Conclusions which are true, of one object or subject matter, to another by way of resemblance or analogy, when no such analogy or resemblance

exists. I think we have an example of this fallacy in the arguments of those who deny the freedom of the human will, on the ground that, it is alleged, its choice must be determined by the strongest motives, or by the preponderance of motives, and in the direction of their resultant. This is true of motion in physical science. But the mind is essentially unlike natural objects in respect to action and motion, whereas the objection to the freedom of the will and the arguments against it, are based on the assumption that they are alike.

503. In fact a large share of what has passed current in psychology and metaphysics, is but a metabasis of the most violent kind. It objectifies abstractions, as "faculties," "ideas," etc., and proceeds to talk of their origin, nature, functions and laws, as though they were realities as substantial as the limbs and tissues of the body. Nor are we without examples of the same fallacy in the attempts at theoretical explanation of the facts in physical science. Heat, light, gravity, etc., are objectified and then we reason about them as though they were measurable, if not "ponderable," substances.

504. So, too, when Cabanis said "the brain secretes thought as the liver secretes bile," if he meant the "*as*" to denote a resemblance of mode and not as an equivalent to "as surely as," he committed a metabasis; for thought and bile being very unlike in their nature, their secretion cannot be alike, even if thought can be said to be "secreted" at all.

505. *No Sequence*; this is akin to, if it is not the same as what is sometimes spoken of as the Fallacy of *Post hoc, ergo propter hoc*, "*after this, therefore on account of this*," although this expression is much more frequently used in reference to physical sequences.

All Conditional judgments or propositions, as we have

seen, assume a logical Sequence between the Antecedent and the Consequent. Wherever there is no such Sequence, we have the Fallacy in Matter that I am now speaking of. The true method of detecting and exposing this fallacy, is to regard the Conditional as an Enthymeme and complete it into a syllogism as has already been described. (§§ 220, 226)

506. *Non excluded middle.* This has been described. (§ 352). A Disjunctive must state all the parts or conditions. As between the conclusion and the Premise of an Enthymeme, as we have seen, there can be no middle proposition in which we can rest while we admit the Premise and deny the Conclusion. But if the disjunctive result from an actual division, the parts whether co-ordinate or alternate, may be ever so numerous, as the case may require or inclination may lead us. But how many soever they are, they must all be mentioned, and there will be one member of the disjunctive Major Premise for each part, which will of course form a term in each part. Otherwise there will not be an Excluded Middle.

507. Thus, in discussing the question of the unity of the origin of the human race, it is customary to say, or rather assume, that "the present diversity owes its origin either to climatic influences or a diversity in the origin of the various races." But manifestly we may have a *tertium quid*, a third supposition without referring to miraculous interposition, of which the above Disjunctive takes no notice as among the possible causes of the phenomena to be accounted for, namely, the origin of a black skin for example, in some mere *lusus naturæ*, some monstrosity, like that of Albinism, and then its perpetuation by the well known laws of the transmission of the congenital peculiarities of the parents to their offspring.

508. Of Fallacies in Method, I have named but two, *Petitio Principii* and *Ignoratio Elenchi*, or in English we may designate them as "Begging the Question," and "Mistaking the Issue or Proof."

509. The simplest form of any complete argument requires two Premises in order to a Conclusion. But for the most part, one of these Premises is already admitted, and needs no argument to enforce it, does not even need in many cases to be so much as explicitly stated, whereas the other is doubted, dissented from or denied. And it is seen and admitted that if that Premise is proved, the Conclusion will follow, and no farther objection will be made. Hence the Premise which the audience or the reader doubt and require to have proved, is for them, a question, and is therefore "*the question.*" If now the advocate should take this Premise for granted, and go on to prove the other and claim assent to the Conclusion on the ground of the proofs he had adduced, his hearers would accuse him of having "begged the question;" of having assumed without proof, and perhaps without so much as effort at proof, the only thing they ever doubted in the Premises.

510: Sometimes this Fallacy runs into a special form called "reasoning in a circle," *curriculum nefas*. In this case a proposition is first used as a Premise for the purpose of proving another as a Conclusion, and this Conclusion is used as a Premise to prove that from which as a Premise, it had been deduced. Thus, for example, it is asserted that "the gravity of bodies is in exact proportion to their quantity of matter." But how will you determine or measure "their quantity of matter"? By weight? Then the assertion becomes "their gravity is in proportion to their gravity," or "their weight is in proportion to their weight." Will you determine it by the

particles? But how do you know how many particles a mass contains? We have no way of counting them or computing them. It is then said "that the number of particles varies with, or is in proportion to, the weight or gravity." Hence we have the gravity of a mass is equal to its quantity of matter.

Its quantity of matter varies with the number of its particles.

The number of its particles varies with its weight.

But its weight is equal to its gravity.

511. *Ignoratio Elenchi* means literally, Mistaking the Proof. It supposes a certain proposition to be proved as a Conclusion and then the introduction of arguments, which are perfectly good and conclusive for the proof of some other proposition perhaps, but have no bearing upon, or tendency to prove the one before the advocate, and which the occasion requires him to prove. An illustration is commonly cited from Thucydides. Cleon had argued that it was *just* for the Athenians to put the Mitylenians to death for their treachery. Diodatus, in reply, said that that was not the question. No one doubted that it was just to put them to death, the only question before the Assembly was, whether under the circumstances, it would be *expedient* to do so.

512. There is, moreover, another form of fallacy in Method, which however, so far as I know, had not attracted the attention of the ancient writers on the subject, but which so exactly comes under the meaning of this name,—Mistaking the Proof—that I will venture to include it in this class. It consists in using one mode of proof when another and a different one is demanded by the nature of the case. Thus if one should attempt to prove a proposition in mathematics by either "induction" or "testimony," the proof would not be what is required.

For at most, the latter, testimony, would establish only a "*probable opinion*" and the other could prove the proposition to be *generally* true indeed, but not absolutely true with no possibility of exceptions.

513. Or in the other direction, if one should attempt to prove a proposition in contingent matter by a demonstration, he could establish or prove only a possibility, or at most, an antecedent probability. It was the great fault of the Scholastic Philosophy which prevailed before the time of BACON, that students in the department of the Natural Sciences even, attempted to establish the doctrines of those sciences by reasoning *a priori*, from certain definitions concerning things, rather than by observation of the things themselves, and inductions based upon observation.

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## SECTION IX.

### METHODS OF REFUTATION.

514. There is no particular kind of argument or reasoning for Refutation. The fact that an argument, or method of argument is used in Refutation, is entirely accidental to the argument itself, how important soever it may be to the parties, or the occasion on which it is used.

515. There are some things, however, that are to be regarded as successful Refutation which prove nothing beyond the mere fact that the author of the reasoning failed to establish his proposition. This is especially the case in what is called the refutation of one's *reasoning* in contrast with the refutation of his *proposition*, that is, the proposition he aimed to prove—his Conclusion.

516. And in fact, we should remember that in discuss-

ing and criticising efforts at proof, it is customary to speak of the conclusion as "the Proposition," and the Premise that is questioned or disputed as "the *Argument*," as though there were but one. And probably, in ninety-nine cases out of a hundred, only one of the two Premises to a Syllogism is ever stated, discussed or thought of, the other being universally assented to. And in many cases, the Premise that is thus acknowledged by all, has, in consequence of having never been disputed or doubted, never been expressly stated, or perhaps, so much as even consciously thought of.

517. *Refutation* may be directed either (1) to one's *reasoning* or (2) to his *conclusion*. And it may in either be (1) direct or (2) indirect.

518. In the *first case* we refute one's reasoning merely by pointing out successfully any fallacy in Form or in Diction.

This method does not show that either his Premises were untrue or that his Conclusion is not true as an independent proposition. It shows only that his argument does not prove it, and places his proposition in the condition of not being proved — "not proven" — as the expression is. And this for many purposes is all that is required, especially in those cases where the "presumption," as it is called, was against the Conclusion, and "the burden of proof" devolved, in consequence, upon him who undertook the proof. "The presumption" is merely a preceding opinion either for or against a proposition, and when "the presumption" or existing belief and assent of mankind is in favor of any proposition, what is called the burden of proof, or *onus probandi* rests on him that would contradict it or dissent from it.

519. Much has been said about the burden of proof resting on one side or another. And it is often stated as



an axiom that the burden of proof rests with "*the affirmative*" side of a question. But, in fact and in theory this is nothing. Any one who undertakes to prove what is not assented to, assumes the burden of proof or the duty and necessity of proving whatever he undertakes to assert. The day has gone by when people will believe because they *ought to*, or when it is sufficient to pronounce some mere unintelligible *abra-ca-da-bra*, *da-bra-ca-bra*, and claim that one's proposition is proved, and *must be* assented to, because he has complied with all the requisitions of a formal and technical system of reasoning. And the only value or importance there is or can be in the old maxim "the burden of proof is with the affirmative," is that it is always the simple converse of the rule, namely, "that it is always best to state the proposition which the occasion and the circumstances require to have proved, so that the proposition will be affirmative in form." And it will be remembered as having been shown in a preceding Chapter (§ 56, 93) that the quality of the proposition is purely accidental—that is, accidental to the proposition; since any proposition may be stated in either quality as we choose.

520. When the presumption in favor of any proposition no mere refutation of the reasoning by which it has been provided will be effectual for the ordinary purposes of argumentation. Most persons are not masters of the arguments by which their opinions are held or have been proved. Nor will persons generally consent to renounce an opinion on a mere technical exhibition of some Fallacy in the argument which they adduce in its support. It must be disproved by arguments against its own truthfulness.

521. It is also a matter worthy of note for its practical bearing that to no persons except those who are

familiar with Logical terms, and expert in the use of them, will it ever be of any avail in pointing out Fallacies, to call them by the names we have been considering. All that our preceding efforts and discussions will accomplish will be to put the scientific reasoner in possession of the truth and a thorough and scientific comprehension of the matter. He is, and must of necessity be left to his own reason and ingenuity to make the matter understood by those with whom he has to do. The best expedient generally, is to give an argument in precisely the same form, to which, however, the Conclusion is so obviously absurd or false that all will acknowledge it to be so, and thus lose confidence in the reasoning itself.

522. For this purpose, a resort to some witticism will often be most effectual; for it is to be considered that anything that passes as a pun, a conundrum or witticism of any kind is only a logical Fallacy in which the verisimilitude is sufficient to deceive for a moment, and not so great as to impose upon the sagacious and thoughtful for more than a moment. If therefore, in the exposition of a Fallacy, we resort to something of this kind, we not only accomplish our object in reference to the argument, but we also enliven the discourse by the wit which is displayed in the example we adduce. It will be worth while to study over the "witticisms," "humors" and "facetiae," that occur in ordinary conversation or in the periodical literature of the day, for this purpose.

523. The exposure of any Fallacy in Matter is also considered as one of the processes of refuting one's reasoning, although in all cases except the *non causa pro causa*, this process implies the disproof of a proposition that has been used either by explicit statement or necessary implication as a Premise. Hence the use of this mode of refutation, with the exception indicated, in-

volves the same principles and methods as the second kind of refutation, namely, refutation of one's Conclusion.\*

524. In refuting one's conclusion it becomes necessary, of course, to establish its contradictory for A and E, O and I; and for I and O, E and A. Conclusions in A and E would indeed be refuted by establishing the contrary to either of them for A, E and for E, A. But their subalterns are more easily proved and just as effectual. The Universals as we have seen, are difficult of proof. If however we would disprove a partial proposition we must establish a universal proposition in the opposite quality.

525. We disprove or refute a proposition which is asserted as universal and not as general merely, by proving one exception; but in order to disprove a general proposition we must show that the exceptions are more numerous than the examples.

526. It is, however, sometimes claimed that a general proposition is not proven, and therefore that we have a right to claim, (because one has not been able in answer

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\* It may be well in this place to repeat the names and the enumeration of the Fallacies, according to their classes, with references to the places where the discussion of them may be found.

1. In Form. Many Terms, 113, 114; Negative Premises, 112, 115, 129; Undistributed Middle, 116; Illicit Process, 117; No Comparison, 170, 173; Illicit Completion, 188; Position, 213; Amotion, 213; Ponente Tollens, 238.
2. In Diction. Figurative Diction, 302; Many Assertions, 304; Ambiguous Middle, 308; Variation (non tale), 311; Division and Composition, 313; Substance and Accidents, 317.
3. In Matter. Non vera pro vera, 495; Non causa pro causa, 500; Metabasis, 502; No Sequence, 505; Non Excluded Middle, 506.
4. In Method. Petitio Principii or Begging the Question, 508; Ignoratio Elenchi, or Mistaking the Proof, 511.

to our challenge to prove the absolute truth of any one of the particulars that come under the rule,) that we have refuted his reasoning. The assumption is that the uncertainty of each particular case is a quantity which can be added to that of each other until the amount, which will attach to the general proposition, is so great as to render it altogether improbable. This, however, is a mistaken view of the nature of that kind of uncertainty. A partial—but never a general—proposition may be proved to be absolutely true when not one single instance coming under it can be proved to any such degree of certainty. (§§ 422, 423)

527. The two following principles are so fundamental and vital to all refutation of propositions that they deserve special emphasis.

(1). *No proposition can be denied or refuted except it is taken literally.*

(2). *There can be no denial of a proposition without a definition of it.*

528. As proof of the first we have the fact that there can be no proposition which if it be taken figuratively will not be true in some of the senses that may be attached to it. This results from the nature of figurative language, and is vastly more important than has been generally considered.

529. Again, the refutation of any proposition *implies its definition*, which may (1) be one that is accepted by both parties and so need not be stated, or (2) it may be given by the party making the assertion, or (3) finally it may be assumed by the party who undertakes the denial or refutation.

530. Thus, a critic speaking of a poem, says “this is beautiful, doubtless, but it is not poetry.” In this criticism he implies a definition of poetry, which he had a

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right to do if there were one that is universally or even generally accepted, as there is in regard to mathematical figures. But if there is no such definition, it was incumbent on him to give the one which he had in mind and which he had used as his test. Or, in default of such a definition, he should have been more modest and said, "I do not regard this as poetry." In this case the proposition would relate to himself and nobody could contradict him, though it might be possible, and proper even, to show that his notion of poetry was all wrong. But as it was no one could dispute him without first *guessing* at his definition of poetry, or agree with him without concurring in it.\*

531. Of course any other term in a proposition may need definition as well as its subject. Thus, if I say "John is asleep," or "John sleeps," the question may arise as between "sleep" coma and other conditions, and so a definition of "sleep" is needed. Or if I say "John walks across the room," the question may be whether he "walks" or gets across in some other way, or it may be whether it be "across," etc.; and of course the first thing is to define or assume a definition of the word in question, and in reference to which we deny the assertion.

532. I have thus spoken of refuting a Conclusion by direct disproof of it, or, what is the same thing, indirect disproof of it by direct proof of its contradictory. And

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\* I remember once hearing a distinguished Professor devote nearly an entire Lecture of an hour's length, to the discussion of the definitions that had been given to poetry. He cited a good many that had been given by different authors, criticised them all and did not like any of them. It is very likely they were at fault, but the Professor made one thing, at least, very apparent—the fact, namely, that he would not be satisfied with any definition of poetry which was not itself poetic. But definitions are never "poetry."

when we have thus disproved the Conclusion, we have shown that there is a Fallacy either in Form, in Diction or in Matter. If there be no Fallacy in Form or Diction then one of the Premises, either an express or an implied Premise, is untrue.

533. Or again, if by the method above described, we disprove either of the Premises, whether that Premise was stated expressly or only implied by the exigencies of the Formula that was used, we release ourselves from obligation to accept the Conclusion as effectually as though we had directly disproved the Conclusion itself.

534. In the latter case, however, that is, when we disprove a Premise, we do not prove the Conclusion to be false, we only show, as in the case of refuting the reasoning, that it is not proved.

535. We may sometimes effect an *Indirect Refutation* also by establishing a proposition inconsistent with the one we wish to disprove, without being its contradictory. Thus, if one should assert that a man was sick in bed, on a certain day, it would be an *Indirect Refutation* of the assertion that on that day he accomplished an undertaking or performed a work, which from its nature requires full strength of mind and body. In some cases, therefore, the *Indirect Refutation* can only raise serious doubts; in others, it will be an absolute disproof. And this will of course depend upon the nature of the case, and must be judged accordingly.

536. But the more common method of *Indirect Refutation* consists in using the Proposition we wish to disprove as a Premise, and then supplying to it another Premise, the truth of which no one doubts, and then deducing from the two a conclusion that is manifestly or demonstrably absurd. In this case, as our supplied Premise is supposed to be beyond question, the adversary

will be reduced to the alternative of admitting either a Fallacy in the Reasoning or, if this be without fault, the falsity of the Proposition which he had used as a Premise; for whenever a Conclusion is not admitted, we must either point out a fault in the reasoning, or admit that one, at least, of the Premises is untrue.

537. In fact, this method of Refutation is but the Indirect Method of Proof already described, and so often and extensively used in Mathematics. In common use, however, it is spoken of as only showing that "one's Principle (Major Premise) proves too much," (§§ 401, 404).

538. I have already spoken of the principle of identity and contradiction as a test for propositions in necessary matter, or the results of demonstration. The application of this principle is also practicable and extensively used in refutation. It could not be otherwise, for the whole refutation of a Proposition consists in the proof of its contradictory; and conversely the proof of any proposition is the refutation of its contradictory. Hence the method can be used with equal facility and equal propriety for either purpose. Consequently if by the means already described, (§§ 364–381) we can reduce any proposition to the form of a contradiction in terms, we shall have most effectually refuted it. And for the most part, we shall have no occasion to go farther and show any fallacy in the reasoning by which it may have been advocated.

539. I have thus reached the end of what I hope will be found a more complete and a more practical treatise than has before been published to the world. I think it will be seen by those who have carefully studied and thoroughly mastered the preceding pages that all *Logical* reasoning is good, and all *good reasoning* is Logical.

540. I have endeavored to keep close to my subject—

Logic—and not run into the department of Rhetoric. For this reason I have carefully analysed, classified and described all the legitimate or valid Syllogisms which the relation of things one to another and their intrinsic nature render possible; and in addition to this I have endeavored to point out, expose and refer to its appropriate class all the Fallacies—that is Arguments having the *form* but not the *force* of Syllogisms—that have been distinctly recognized, or that have seemed to me at all possible. But I have made no effort to enumerate, describe or put my reader on his guard against the thousand varied “*tricks*” to which the unscrupulous sophist may resort in his efforts to conceal conscious error, or for any purpose, “to make the worse appear the better reason.” This belongs to Rhetoric taken in its largest sense, or to a special science—Dialectics—taken in a narrower sense. But the number and name of them is “Legion.” No complete enumeration of them has ever been made or can be made, and no technical rules and formulæ can put one effectually on his guard against them. Nothing but the keenest insight and the most constant care and watchfulness can prevent one from being sometimes misled by the specious sophistries of others, or the still more seductive allurements of his own ingenuity.



## APPENDIX.



## APPENDIX.

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### EXAMPLES FOR ANALYSIS AND CRITICISM.

In the analysis and criticism of Arguments, the first thing to do is to find what is really the Conclusion, then analyze that as a Proposition, according to the principles laid down in Part II, 2nd Chapter.

We can then identify the Premises and distinguish between the Minor and the Major, since the Minor Premise always contains the *Subject* of the Conclusion.

If there be more than the allowed number of terms, complete the Formula by the formation of such a proposition as is necessary for its completion, always remembering that we have no right to interpose a *universal* proposition where a *partial* one will answer all the needs of the formula.

Having done these things we are prepared to test the formula by the rules and criteria already laid down, and it will be well for the student in every case to refer to the paragraph in the foregoing pages on which he depends for the justification of his criticism.

Having settled it in our mind that there is no Fallacy in Form, the next thing *usually*—perhaps I ought to say that the *first* thing usually—is to consider whether the Conclusion be true or false, such an one as we are prepared to assent to or not, on grounds totally independent of the Premises given in the Syllogism. If it be one that we readily assent to we seldom trouble ourselves to consider it any farther. If, on the contrary, we regard the conclusion as untrue or absurd at the first glance, we look for a reason for not accepting it; and this reason or excuse we expect to find, and do find, for the most part, in something which we call a Fallacy.

But is quite as important to sound and earnest reasoning that we know what a Fallacy is and why any particular argument is a Fallacy, as that we know what is good reasoning.

In order to criticise any Syllogism with reference to any Fallacy in Diction it is necessary first to examine it in reference to Fallacies

in Form: for if it be faulty there, there is no occasion to proceed any farther.

Fallacies in Diction can be detected only by ascertaining and considering the meaning of the terms used, and the purpose and intention of their use, so far as this can be gathered from the context of the proposition and the connection in which, and the circumstances under which it was used. Hence the great difficulty of presenting any satisfactory collection of examples of Fallacy in Diction; it is often the case that we cannot tell in what sense the author intended his words to be understood without larger quotations than can be given in such a place as this.

Again we must remember that although I have given the Premises of the Argument here in immediate juxtaposition and sequence one upon another, it is in fact but seldom the case that they are so found in books or so used in conversation. On the contrary they are usually spread a good ways apart, and hence it is that fallacies which like many in the following collection, seem too obviously fallacious to allow us to think that they ever could have occurred in sober, earnest reasoning, did actually occur and escape for the time, detection by either the reasoner or his hearers.

In order to successful criticism of argumentative works, therefore, it is necessary first of all to select from the book or whatever it may be, what are the real Premises and the real Conclusions and dropping out of sight for the time all else, bring those parts close together and place them in immediate juxtaposition.

It is also worth mentioning that anything which passes for a joke, a bull, a conundrum, a witticism in fact of any kind is only a fallacy, for the most part a Fallacy in Diction, where the fallacy is so obvious as to be apparent at second thought though not so on the instant of its utterance.

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#### EXAMPLES IN FORM.

1. No conscientious person will do an intentional wrong; the man who willingly defrauds his neighbor does him an intentional wrong, therefore, no one who intentionally defrauds his neighbor is a conscientious person.

2. All opaque bodies shine with reflected light; the planets are opaque bodies, therefore, the planets shine with reflected light.

3. All men are accountable beings ; all accountable beings are under the immediate government of God, therefore, some of those who are under the immediate government of God are men.

4. All the vegetable alkalies are deadly poisons ; yet all the vegetable alkalies are useful medicines, therefore, some useful medicines are deadly poisons. ▼

5. All who are qualified to vote, are able to understand the significance of the vote they cast. But no person wholly ignorant of the laws and institutions of his country, can understand the significance of the vote he casts, therefore, no such person is qualified to vote.

6. No unnecessary restraint should be imposed on man ; the prohibition of innocent amusements is an unnecessary restraint, therefore, the prohibition of innocent amusements should not be imposed.

7. The boy stands on the stool ; the stool stands on the floor, therefore, the boy stands on the floor.

8. All unrighteous persons are justly offensive to those that are around them ; but none that are justly offensive to those that are around them can enter Heaven, therefore, no unrighteous person can enter Heaven.

9. No contract to do what is wrong can have any binding force. But all contracts to do what is wrong are used as excuses to the conscience by those who do wrong, therefore, some things that are used as excuses by those that do wrong have no binding force.

10. All metals are dug out of the earth ; coal is dug out of the earth, therefore, coal is a metal.

11. Some of the animals that live in the sea are six-legged ; but all six-legged animals are insects, therefore, some insects live in the sea.

12. Whatever opposes human progress is an unnecessary evil ; some of the usages of the past oppose human progress, therefore, some of the usages of the past are unnecessary evils.

13. All indulgence is unfavorable to mental vigor ; but some indulgences are deemed innocent, therefore, some things deemed innocent are unfavorable to mental vigor.

14. No wrong may be done that good may come of it ; but whatever is done that good may come of it, is done from a good motive, therefore, some things done from good motives are, nevertheless, wrong.

15. No mere trick deserves success ; but some things deserving success are done from disinterested motives, therefore, some of the things done from disinterested motives are not mere tricks.

16. Those who endure evils merely because they cannot escape them are no true heroes. Some of those who have been reckoned martyrs, endured only because they could not escape their sufferings, therefore, some that have been reckoned martyrs are no true heroes.

17. No man of enlightened mind can oppose the education of the people ; but some ecclesiastics do oppose the education of the people, therefore, some ecclesiastics are not of enlightened minds.

18. No candid man will be influenced by prejudice ; but some candid men err in judgment, therefore, some who err in judgment are not influenced by prejudice.

19. All the fixed stars shine with their own light. Some of the heavenly bodies do not shine with their own light, therefore, some of the heavenly bodies are not fixed stars.

20. Some fictitious compositions are not injurious. But all fictitious compositions affirm what is not true, therefore, some compositions that affirm what is not true, are not, nevertheless, injurious.

21. Some things allowed by the law are, nevertheless, dishonest. All the things that are allowed by the law, however, may be done with impunity, therefore, some dishonest things may be done with impunity.

22. Air is essential to the support of vegetable life ; but the light of the sun is not air, therefore, the light of the sun is not necessary to vegetable life.

23. No discontented persons are happy ; but the poor are not always discontented, therefore, the poor are not always unhappy.

24. Some recreations are necessary to the preservation of health and spirits. All recreations, however, are liable to be carried to excess and be abused ; so that some things liable to abuse are nevertheless necessary for man.

25. Any one who is candid will refrain from condemning a book without reading it: some Reviewers do not refrain from this; therefore some Reviewers are not candid.

26. Sensualists wish to enjoy perpetual gratification without satiety. But this is impossible; therefore the sensualist desires what can never be attained.

27. Liberality is a means of making others happy. But it is not a means of making one's self rich; therefore making one's self rich does not always make others happy.

28. Satire is a legitimate mode of exposing the failings of others. But the calling others by ill-names is not satire; therefore it is no legitimate mode of exposing their failings.

29. No one is free who is enslaved by his appetites. The sensualist is enslaved by his appetites; therefore no sensualist is free.

30. No one is rich who has not enough. No miser has enough; therefore no miser is rich.

31. Some men like strong drink. Yet strong drink ruins them; therefore some men love what ruins them.

32. It is a difficult task to restrain all inordinate desires. To conform to the precepts of Scripture implies a restraint of all inordinate desires; therefore it is a difficult task to conform to the precepts of Scripture.

33. All amiable men merit the esteem and respect of their fellow men. And certainly all who aim only to do good to their fellow men, deserve to be esteemed and respected on that account; hence all who are striving to do good to others are amiable men.

34. A man who deliberately devotes himself to a life of sensuality is deserving of strong reprobation. But those do not deliberately devote themselves to a life of sensuality who are hurried into excess by the impulse of the passions; such therefore as are hurried into excess by the impulse of the passions are not deserving of strong reprobation.

35. Things are soon ready in a well ordered house. Mine is a well ordered house; therefore things are soon ready in it.

36. Things are soon ready in a well ordered house. Things are never soon ready in my house; therefore mine is not a well ordered house.

37. Things are soon ready in a well ordered house. My house is not a well ordered house; therefore things are never soon ready in it.

38. Some effectual check to the progress of seditious publications is absolutely essential to the safety of our country. The total abolition of the art of printing would prove such a check; therefore the art of printing should be totally abolished.

39. Every hen comes from an egg. But every egg comes from a hen; therefore every egg comes from and egg.

40. Some of the heathen authors deserve credit. But all heathen authors relate prodigies; therefore prodigies deserve credit.

41. Tyranny is an unnecessary restraint upon human liberty. The English government imposes no unnecessary restraint upon the liberty of its subjects; therefore the English government is no tyranny.

42. All that glitters is not gold. Tinsel glitters; therefore it is not gold.

43. No trifling business will enrich those that engage in it. Speculation is no trifling business; therefore speculation will enrich all who are engaged in it.

44. No cat has two tails. Every cat has one tail more than no cat; therefore every cat has three tails.

45. All truly great men are generous and noble in their disposition. There are, however, few men that are truly great; hence most men are not generous and noble in their disposition.

46. That man is independent of the caprices of Fortune who places his chief happiness in moral and intellectual excellence. A true philosopher is independent of the caprices of Fortune; therefore a true philosopher places his chief happiness in moral and intellectual excellence.

47. None but whites are civilized. The Hindoos are not white; therefore the Hindoos are not civilized.

48. None but whites are civilized. The ancient Germans were whites; therefore they were civilized.

49. None but civilized people are white. The Gauls were white; therefore they were civilized.

50. Only patriotism can save a nation. But political sagacity is not patriotism; therefore political sagacity cannot save a nation.

51. All the Helots were slaves, and all the Athenians were free; therefore no Athenians were Helots.

52. All acts of Congress require the signature of the President. But joint resolutions are not "acts" of Congress; therefore they do not require the signature of the President.

53. Meat and drink are necessities of life. The revenues of Vitellius were spent on meat and drink; therefore they were spent on the necessities of life.

54. Persons that have been accustomed to freedom can never be happy in a state of servitude. The American slaves have never been accustomed to freedom; therefore they are happy in their servitude.



55. A tariff on imported goods will raise the price of the article to the consumer, whether imported or of domestic manufacture. But a tariff is a means of protecting domestic industry; therefore the protection of domestic industry raises the price of the articles we consume.

56. The ancient astrologers spoke of Mars and Jupiter and Saturn. But Mars, Jupiter, etc., are planets; therefore the ancient astrologers spoke of the planets.

57. Gold and silver are precious metals. And gold and silver have always been used as money; therefore the precious metals have always been used as money.

58. Animals and vegetables are the only organic bodies. Sponges are not animal and vegetable; therefore sponges are not organic bodies.

59. Agriculture and manufactures create wealth. But trade is neither agriculture nor manufactures; therefore trade does not create wealth.

60. The study of Mathematics is essential to a complete education, because it produces a habit of close and constant reasoning.

61. Familiarity is productive of contempt, inasmuch as it occasions a needless exposure of private failings.

62. Man needs the restraints of law, since he is naturally selfish; and is, moreover, subject to desires and passions which have no limit or power of restraint in themselves.

63. Wilkes was a favorite with the populace. He who is a favorite with the populace must understand how to manage them; he who understands how to manage them, must be well acquainted with their character; he who is well acquainted with their character, must hold them in contempt; therefore Wilkes must have held the populace in contempt.

64. The child of Themistocles governed his mother; she governed her husband; he governed Athens; Athens, Greece; and Greece, the world; therefore the child of Themistocles governed the world.

65. A wise man is never surprised because he is never disappointed; and he is never disappointed, because he forms no expectations that are not placed upon the most certain basis.

66. Whoever receives the stolen goods from a thief, becomes thereby partaker of his guilt. John is a thief; therefore whoever receives the stolen goods from him becomes partaker of his guilt.

67. Of two evils the less is to be preferred; therefore since occasional turbulence is a less evil than a rigid despotism, it is to be preferred.

68. Jupiter was the son of Saturn; therefore the son of Jupiter was the grandson of Saturn.

69. Discord is a greater vice than intemperance, since discord always implicates more than one person in its guilt.

70. Capitalists will use their money in giving employment to labor, only on condition that they can make money by doing so; and they can make money by it only on condition they can sell the commodities that are produced by the labor; and they can sell these commodities only on condition there are people able to buy them; and the people will be able to buy, only on condition that their own labor is sufficiently productive to leave them in possession of means to buy with, after paying for those other things that must be provided for first. Hence, it is not the amount of capital that is employed in trade, but the productiveness of labor, that will determine the amount of trade in any community.

71. That which excites a passion always precedes it. Insult excites anger; therefore it always precedes anger.

72. All our conceptions of existence are one kind or another of thought; therefore existence is thought.

73. If fire may be separated from flint, a property may be separated from its subject. But fire cannot be separated from flint; therefore a property cannot be separated from its subject.

74. If hatred and malice are contrary to the Divine law, they ought to be avoided. That they are so no one can deny; therefore they should be avoided.

75. If the penal laws against the Papists were enforced, they would be oppressed and wronged. But those laws are not enforced, and therefore they have nothing to complain of in the way of oppression or persecution.

76. If testimony to miracles is to be admitted, the miracles claimed for Mahomet are to be admitted. But as the narrative of those miracles is not to be admitted, no testimony to miracles is to be admitted.

77. If the exercise of war in defence of one's country were sinful, it would have been forbidden in the Scripture, either expressly or by implication. But it is not so forbidden; therefore we may safely infer that defensive wars are not sinful.

78. If the fourth commandment is obligatory, we are indeed bound to set apart one day in seven. But no one supposes now that that commandment is obligatory; hence there is no obligation to keep one day any more sacred than another.

79. The adoration of images is forbidden to Christians if the Mosaic law was designed, not for Israelites alone, but for all men. It was, however, designed for Israelites alone; hence the adoration of images is not forbidden to Christians.

80. A wise lawgiver must either recognize the rewards and punishments of a future state, or he must be able to appeal to a Providence dispensing them in this life. Moses did not do the former, and therefore he must have done the latter.

81. The virtues are either passions, faculties, or habits. But they are not passions, for passions do not depend on previous determination; and they are not faculties, for faculties are possessed by nature; the virtues, therefore, are habits acquired by voluntary exertion and effort.

82. The early assignment of the Epistle to the Hebrews to St. Paul as its author, must have been either from its being really his, or from its professing to be his and containing his name. But it makes no claim to being his. Consequently, nothing but a knowledge of the fact that he wrote it could have led the early Christians to attribute it to him.

83. If every objection that can be urged would justify a change of established laws, no laws could reasonably be maintained. But some laws can be reasonably maintained; therefore, no objection that can be urged will justify a change in established laws.

84. If any complete theory could be framed to explain the establishment of Christianity by human causes, such a theory would have been propounded before this time. But no such theory has been proposed; therefore, we may conclude that no such theory can be devised.

85. If a man is ignorant he should consult others as a means of making up his deficiency in knowledge. If he is wise, yet two heads for counsel are better than one; therefore, in all important matters one should take counsel with others.

86. If one is superior to others he should be polite and gentle in his manners towards them, as a matter of Christian compassion and magnanimous condescension. If he is among equals he should be civil and courteous, since such a demeanor is as much their right

from him as his right from them. And if he is among his superiors, he should show himself courteous and civil, as being due to those having authority over us for the good of the whole. In any case, therefore, we are bound by the most sacred obligations to be civil and considerate of the feelings of others.

87. If the Government provides for these debts by imposition, it will become odious to the people and perish. If it does not provide for them, it will be overthrown by the most dangerous of all parties, I mean extensive discontent of the moneyed interest,

88. If I am under the chastening hand of God, and if there is no unrighteousness in Him, it must be that I am punished for my iniquity.

89. If expiatory sacrifices were divinely appointed before the Mosaic law, they must have been expiatory not of ceremonial sin (for there could be none then), but of moral sin. If so, the Levitical sacrifices must have had no less efficacy. In that case the atonements under the Mosaic law would have 'made the comers thereunto perfect, as pertaining to the conscience.' But this they could not accomplish. Hence we infer that expiatory sacrifices could not have been appointed before the Mosaic law.

90. If transportation is not felt as a severe punishment, it is in itself ill-suited to the prevention of crime : if it is so felt, much of its severity is wasted, from its taking place at too great a distance to affect the feelings, or even come to the knowledge, of most of those whom it is designed to deter ; but one or other of these must be the case : therefore, transportation is not calculated to answer the purpose of preventing crime.

91. When the observance of the first day of the week, as a religious festival in commemoration of Christ's resurrection, was first introduced, it must have been a novelty : when it was a novelty, it must have attracted notice : when it attracted notice, it would lead to inquiry respecting the truth of the resurrection : when it led to this inquiry, it must have exposed the story as an imposture, supposing it not attested by living witnesses : therefore when the observance of the first day of the week, &c., was first introduced, it must have exposed as an imposture the story of the resurrection, supposing it not attested by living witnesses.

92. If the prophecies of the Old Testament had been written without knowledge of the events of the time of Christ, they could not correspond with them exactly ; and if they had been forged by Chris-

tians, they would not be preserved and acknowledged by the Jews : they are preserved and acknowledged by the Jews, and they correspond exactly with the events of the time of Christ ; therefore, they were neither written without knowledge of these events, nor were forged by Christians.

93. Now "if Christ be preached that He rose from the dead, how say some among you that there is no resurrection from the dead ? But if there be no resurrection of the dead then is Christ not risen ; and if Christ is not risen then is our preaching vain, and your faith is also vain. Yea, and we are found false witnesses against God, because we have testified of God that He raised up Christ whom he raised not up, if so be that the dead rise not. For if the dead rise not, then is not Christ raised ; and if Christ be not raised your faith is vain, ye are yet in your sins. Then they also which are fallen asleep in Christ are perished.

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## EXAMPLES IN DICTION.

94. The end of a true soldier's life is the welfare of his country : but death is the end of a soldier's life ; therefore, his death is requisite to the safety and welfare of his country.

95. Time is sufficient for all things : a day in summer is time ; therefore, a single summer's day is sufficient for all things.

96. The fish inclosed in the net were an indiscriminate mixture of all kinds ; those that were set aside and saved as valuable, were fish that had been inclosed in the net ; therefore, fish of all kinds were set aside and saved as valuable.

97. No man can possess the power to perform an impossibility. But a miracle is an impossibility ; therefore, no man can work a miracle.

98. This team is used every day in the week. But Sunday is a day in the week ; therefore, this team is used on Sunday.

99. To kill a man is a crime. . A burglar breaking into a house is a man ; therefore, to kill a burglar when breaking into your house, is a crime.

100. The principles of justice are variable : the appointments of nature are invariable : therefore, the principles of justice are no appointment of nature.

101. Labor will overcome all obstacles ; agriculture is labor, therefore, agriculture will overcome all obstacles.

102. A story is not to be believed, the reporters of which give contradictory accounts of it ; the story of the life and exploits of Bonaparte is of this description : therefore, it is not to be believed.

103. Nothing which is of less frequent occurrence than the falsity of testimony, can be fairly established by testimony ; any extraordinary and unusual fact is a thing of less frequent occurrence than the falsity of testimony (that being very common) : therefore, no extraordinary and unusual fact can be fairly established by testimony.

104. Testimony is a kind of evidence which is very likely to be false ; the evidence on which most men believe that there are pyramids in Egypt is testimony : therefore, the evidence on which most men believe that there are pyramids in Egypt is very likely to be false.

105. God made our first parents ; but our first parents were sinners, therefore, God made sinners.

106. He who cannot possibly act otherwise than he does, has neither merit nor demerit in his action. A liberal and benevolent man in relieving the sufferings of the poor cannot do otherwise than relieve them : therefore, there is no merit in his actions.

107. Madame De Stael says that genius is of no sex : but Madame De Stael was a genius ; therefore, she was of no sex.

108. Whatever intoxicates is forbidden by the principles of morality. But wine, cider and ale intoxicate ; therefore, their use is forbidden by the principles of morality.

109. Every poor clergyman is deserving of the gratitude and sympathy of all good men for the sacrifices he is making in the cause of religion and morality. But every clergyman who entirely neglects his duty is a poor clergyman ; therefore, every clergyman entirely neglecting his duty is deserving of the gratitude and sympathy of all good men.

110. A young lady that receives gifts and other tokens of affection from a married man is disgraced thereby. Her father is a married man ; therefore, the young lady that receives gifts, etc., from her father is disgraced.

111. Christ died for sinners only ; but all that are now or ever will be in heaven are among those for whom Christ died ; therefore, those now in heaven or hereafter to be there are sinners.

112. The water that falls on the mountains and hills, either runs down the sides or soaks into the ground and forms subterranean reservoirs and then appearing as springs and forming brooks and rivulets, finds its way to larger streams and then into the ocean. But the water that falls on the mountains and hill-tops is for the most part snow and ice ; therefore, that which forms the rivers and runs into the ocean is for the most part snow and ice.

113. The cause of evil is itself an evil. But that Christianity has caused much evil in the shape of wars, oppression, imposture, fanaticism and persecution cannot be denied.

114. "Property is a creation of law." Horses are property ; therefore, horses are a creation of law.

115. He who has a confirmed habit of any kind of action, exercises no self-denial in the practice of that action : a good man has a confirmed habit of virtue ; therefore, he who exercises self-denial in the practice of virtue is not a good man.

116. He is the greatest lover of any one who seeks that person's greatest good : a virtuous man seeks the greatest good for himself ; therefore, a virtuous man is the greatest lover of himself.

117. A building is not a nuisance ; but a pig-pen is a building, therefore, a pig-pen is not a nuisance.

118. A protective tariff is a measure designed to promote the interests of domestic industry : the advocates of free trade oppose a protective tariff ; therefore, the advocates of free trade oppose the interests of domestic economy.

119. Theft is a crime : theft was encouraged by the laws of Sparta ; therefore, the laws of Sparta encouraged crime.

120. No evil should be allowed that good may come of it. But all punishment is an evil ; therefore, no punishment should be allowed.

121. Repentance is a good thing. But no persons have so much repentance as the wicked ; therefore, none have so much good as the wicked.

122. He who bears arms at the command of the magistrate does what is lawful for a Christian. The Swiss in the French service, and the British in the American service bore arms at the command of the magistrate ; therefore, they were doing only what was lawful for a Christian to do.

123. He who calls you a man speaks the truth ; but he that calls you a knave calls you a man ; therefore, he who calls you a knave speaks the truth.

124. All the material objects within the reach of the earth's attraction tend downwards towards the earth. But smoke is a material object; therefore smoke tends downwards.

125. Washington, Adams, Jefferson and Madison went out of the office at the age of sixty-six. But Washington, Adams, etc., were Presidents of the United States; therefore the Presidents of the United States go out of office at the age of sixty-six.

126. These are all good men and true and have been so pronounced by the court every one of them. But of these men some are known to be profane swearers, others are occasionally intoxicated, one or two live in adultery, and one at least has been engaged in rebellion against his country; therefore it is possible for men to be profane, intemperate, licentious or even rebels and yet be good and true men.

127. A monopoly of the sugar-refining business is beneficial to sugar-refiners; and of the corn-trade to corn-growers; and of the silk-manufacture to silk-weavers; etc., etc.; and thus each class of men are benefitted by some restrictions. Now all these classes of men make up the whole community; therefore a system of restrictions is beneficial to the community.

128. I cut this cane from an orange tree in Florida. But what I cut in Florida was a mere rough crooked branch of a tree; therefore this cane is but a rough, crooked stick.

129. What we wear upon our backs once grew upon the backs of sheep. But mere unspun and unwashed wool is all that grows upon the backs of sheep; therefore what we are wearing is merely unspun wool.

130. No man ever died on Thursday who was not alive the preceding Wednesday; therefore their living on Wednesday was the cause of their dying on the Thursday following. No man should live through Wednesday; it is dangerous.

131. Animal food may be entirely dispensed with (as is shown by the practice of the Brahmins and of some monks); and vegetable food may be entirely dispensed with (as is plain from the example of the Esquimaux and others). But all food consists of animal food and vegetable food; therefore all food may be dispensed with.

132. The Republicans as a general thing advocate a Protective Tariff. But a Protective Tariff is inseparable from high prices: therefore the Republican party are in favor of high prices.



133. The Democrats are in favor of Free Trade. But Free Trade reduces the wages of labor and increases the inequality between the rich and the poor; therefore the Democrats are in favor of increasing the difference between the rich and poor, making the rich richer and the poor poorer.

134. The papers say that insurgents against the Turkish government are Cretans. But "the Cretans are always liars;" therefore the papers say that the insurgents etc., are liars.

135. Government is of divine institution. But the government is either a monarchy, an oligarchy or a democracy; therefore either monarchy, oligarchy or democracy must be of divine institution and all other forms are contrary to the Divine Will.

136. Wine will intoxicate those that drink it. But Christians in the sacrament of the Lord's Supper drink wine; therefore Christians in practicing the Communion drink what will intoxicate them.

137. Love makes every sacrifice easy. A man's affection for himself is love; therefore a man's affection for himself or self-love makes all sacrifices easy.

138. Monarchists (of this class) claim for kings a divine right to rule. But kings in ruling commit many crimes and outrages; therefore such monarchists claim for kings a divine right to do wrong.

139. Whatever is deposited at the bottom of lakes, seas etc., is soft mud. Limestone was deposited at the bottom of the sea; therefore limestone is mere soft mud.

140. Baron Rothschild was made a peer of England because he was rich. He became rich by lending money on interest; Rothschild was created a baron therefore for no other reason than that he had loaned money upon interest successfully.

141. The Constitution of the United States says that "the Senate shall have the sole power to try all impeachments." The tribunal that tried Andrew Johnson, however, was not "the Senate," but the "High Court of Impeachment;" consequently the trial of Johnson was not in accordance with the Constitution of the United States.

142. St. Paul says "If I yet pleased men I should not be the servant of Christ." Wherefore regarding St. Paul as an inspired authority we may infer that whoever pleases men or is popular with his fellow-men and in his own age and community is not a true and accepted servant of Christ.

143. The Bible teaches that servants shall obey their masters in all

things, sincerely and from the heart not with mere eye service as men-pleasers. And this is equivalent to telling them to do whatever their masters direct or command them to do. But in some cases the masters direct their servants to commit crimes and do very wicked things; therefore the Bible teaches the servants in these cases to commit crimes etc.

44. The Constitution of the United States protects every citizen of the United States in those rights of person and property which the State in which he may happen to live secures to him by its laws. But the laws of some of the States secure to certain of its citizens the complete enslavement of one class of its population; therefore the Constitution of the United States protects the institution of slavery and guarantees to the slaveholder his rights of property in his slaves.

145. In the winter of 1867 Congress passed a law regulating the land and naval forces of United States which the President disapproved and vetoed. It was, however, passed over his veto and subsequently issued as an order to the officers of the army and navy, the order being endorsed by the President with the usual word "approved." Afterwards on the trial of his impeachment counsel argued from this that he had "approved" *the law* and was therefore estopped by his own act from afterwards treating it as unconstitutional.

THE END.

